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Agrium

December 30, 1999

RECEIVED
JAN 4 2000
DIVISION OF
ENVIRONMENTAL QUALITY
SEIRO

Ms. Audrey Cole
Regional Administrator
Division of Environmental Quality
224 South Arthur
Pocatello, Idaho 83204

RE: Title V Permit Application; Revisions to Section 7 Excess Emissions Procedures

Dear Ms. Cole,

Subtle changes in operating procedures and equipment details have necessitated revisions to our Startup/Shutdown/Operating procedures contained in Section 7 of our Title V Tier I Operating Permit Application, Second Amended Version, dated April 1, 1999.

Section 7 of the application is divided into three parts: Area 1 - #4 Calciner and North Calciner; Area 2 - East Sulfuric Acid Plant; Area 3 - DAP Plant. It is our goal to eliminate or minimize excess emissions in all areas of our facility. Operating procedures are refined to that end. However, certain conditions and circumstances in the areas outlined above could possibly result in excess emissions.

The bound copies being forwarded to you today are meant to be inserted into our Title V permit application (4/1/99 version) as a replacement for Section 7. Please discard the old Section 7 and insert the new pages enclosed. Two (2) extra copies are included for your convenience in forwarding to the Boise office.

If you have any questions, please call me at the number listed above.

Sincerely,

Monty Johnson
Environmental Manager

Enc.

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DIV. OF ENVIRONMENTAL QUALITY
TECHNICAL SERVICES OFFICE

Section 7
Excess Emissions Procedures
IDAPA 16.01.01 Rule 133.02 and 134.04

The following excess emissions procedures are submitted by Nu-West in accordance with IDAPA 16.01.01.133.04.b and IDAPA 16.01.01.134.06.c. There are processes in the facility that may emit in excess of permitted emission limits during normal start-up, shutdown, or scheduled maintenance. In addition, unexpected upsets or breakdowns can occur. These processes are discussed below as well as the excess emissions procedures taken to minimize the environmental impact of these events.

Area 1 - #4 Calciner and North Calciner

During a cold-startup the calciner beds must be fed with 100% dry or pre-calcined ore. This operation continues until the calciner bed compartments have been loaded with a predetermined quantity of ore and have reached a predetermined temperature. When the correct operational parameters are reached, wet ore may then be started into the calciner feed. Procedures to minimize excess emissions are written into the policy of operational startup of the plants.

The above procedure results in emissions which may exceed visible emissions limitations specified in IDAPA 16.01.01.625 (ie; 20% opacity by VE). Excess emissions of other pollutants from calciner operations listed on sheets "ER-5 and ER-6" in section 3 of this application would also be likely.

The information required at IDAPA 16.01.01.314.03 is as follows:

(03.a) The equipment identified as the #4 Calciner can be cross-referenced as S-Ca-1 and North Calciner can be cross-referenced as S-Cb-1 in this application.
(03.b) The specific pollutants likely to be emitted in excess of applicable standards are PM and Fluorides.
(03.c) The estimated amount of excess emissions expected to be released during each event would be extremely difficult to quantify, but the term 'excess' implies greater than the emission limit. (03.d) The expected duration of each excess emissions event would depend on the individual circumstances of each event.
(03.e) Efforts to minimize the amount and duration of each excess emissions event will be maintained. Excess emissions may be unavoidable for any of the three types of excess emissions events: startup, shutdown, and scheduled maintenance, because the pollution control devices associated with this equipment are essential to its operation.
(03.f) The frequency at which the three types of excess emissions events are expected to occur cannot be specified.
(03.g.i) Scheduled maintenance is needed when the operating equipment is not functioning properly, or when pollution control equipment is not functioning properly.
(03.g.ii) Scheduled maintenance is usually performed during periods when operation of the emissions unit or other sources has been reduced or ceased. Maintenance to the equipment usually cannot be affected without reducing or ceasing operation.

(03.g.iii) Maintenance is scheduled to minimize downtime, minimize excess emissions; to optimize performance of the equipment and control devices, and maximize on-stream time. Good engineering practices are followed when performing scheduled maintenance.
(03.g.iv) Where applicable, it may be necessary to by-pass, take off line, or operate pollution control equipment at reduced efficiency while maintenance is being performed in order to prevent greater excess emissions from occurring if the entire process were shut down.
(03.g.v) Auxiliary air pollution control equipment is not applicable to this equipment.
(03.h) Good engineering practices are followed relative to this equipment. Modifications and redesign are pursued when they are efficacious.
(03.i) Detailed specification of the procedures to be followed by the owner or operator which will minimize excess emissions at all times during startup, shutdown, and scheduled maintenance follow this section.

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Conda Phosphate Operations

Dorr-Oliver FluoSolids Phosphate Rock Calcination System
Operating Instructions

STARTUP PROCEDURE - GENERAL

Startup of the calcination system involves preheating the calcination Reactor, and starting beds, to operating temperatures. Concurrently, the associated equipment must also be started so that rock is available for the calcination Reactor when operating temperature is attained.

A starting bed of dry rock is added to the preheat compartment and with fluidizing air passing through the Reactor, preheating is begun with the preheat burners located in the cooling compartment of the Reactor. As the firing rate is increased, the preheat temperature is held at 300^{O} F maximum by water spray in the preheat compartment. When the air temperature in the calcining compartment approaches 600^{O} F, the starting bed of rock is transferred to the calcining compartment and additional rock added to the preheat compartment. At 1350^{O} F the fuel gas guns may be used. The preheat burner, having served its function, is now turned off. Preheating is concluded when the calcining bed is heated to calcination temperature. At this time, rock feed is started to the Reactor and continuous operation of the Reactor has commenced. Here after, calcining compartment temperature will be controlled by the fuel rate. preheat compartment temperature controlled by water spray or feed addition.

When the volume (or bed level) of the preheat and calcining compartments reach a predetermined level, transfer to the cooling compartment and product removal from the Reactor is started.

The cooling system is started when the cooling compartment's bed volume is approaching the predetermined bed level. At this time, the aftercooler fluidizing blower is adjusted to design flow rate. Feed to this system is begun by manually opening the transfer valve from the Calcining Reactor. Adjustment of the hot rock transfer rate, fluidizing air and spray water is

made to maintain the cooler bed and cyclone dust collector operating temperature at about 250° F. Final adjustments of all process parameters are then made to obtain complete integration of the calcining and cooling systems so that both systems act as one continuous operating unit and all control instruments can be switched to automatic control.

CAUTION

During periods of startup it is important that the preheat compartment temperatures do not become excessively high. Temperatures above 400° F can be detrimental to the carbon steel components, the exhaust fan in particular. To hold this temperature down, the preheat bed spray system should be activated to open the water valves allowing spray water to enter the system. In the event that this does not correct the situation, it will be necessary to put the feed system into operation

Specific Startup Instructions

A. Preliminary Startup Check-Off List and Preparations

1. Energize instrument panel and all electrical components at the motor control center by closing all of the following switches:
   - ☐ Calciner Feed Conveyors and Feeder
   - ☐ Calciner Exhaust Fan
   - ☐ Calciner Fluidizing Blower
   - ☐ Aftercooler Fluidizing Blower
   - ☐ Scrubber Effluent Tank Pumps
   - ☐ Aftercooler Cyclone Gate Valve

2. Check and adjust instrument air supply to 60 - 80 psig.
3. Check and adjust instrument air supply to all controllers and operators to 20 psig.
4. Adjust all purge air valves to all pressure taps, sight glasses. (Fluidizing Blowers must be running).
5. Set all manual loading stations on panel board to 0 psig.
6. Set all automatic controllers on panel board to *"MANUAL"*. Also set all output pressures to 0 psig.
7. Adjust all set points on automatic controllers to predetermined readings.
8. Make sure the following materials are available:
   a. Feed bins full
   b. Fuel gas, and water
9. Curing of Refractories at Initial Startup
   a. Air Drying of Refractories

      Each compartment of the Reactor plus the hot cyclones are refractory lined. These refractories must be cured prior to actual startup of the plant

      Remove the pipe caps from the curing vents in the Reactor roof. At this time a thorough check of the Reactor interior is recommended. Be sure that the refractory work is 100% completed, that all construction tools and trash are removed and that all nozzles and internal parts are in place. Allow the Reactor to air dry for 24 hours.

      Initial drying of the refractories is accomplished by blowing fluidizing air through the system. Close all manholes. Air is vented through the scrubber to the stack. With all manholes closed, continue refractory drying by blowing air through the system for at least 24 hours. During this time check and record the pressure drop across the Reactor constriction plate and the two domes with the solids discharge valve closed. Pressure drops

9. *Curing of Refractories at Initial Startup (cont.)*

a. Air Drying of Refractories(cont.)

should be checked and recorded for about 50%, 75%, 100% and 115% of normal design air flow rate. Record, along with the air flow rate and constriction plate pressure drops, the air temperatures in the Reactor.

b. With exhaust fan, and fluidizing air blowers "ON", and water flowing in scrubber, ignite preheat burner at minimum flame (please refer to Preheat Burner Instructions.) Close the Aftercooler exhaust gas damper to prevent hot gases from passing through the Aftercooler. Hold the minimum fire on the burner for 24 hours. The cooling compartment temperature should stabilize at 150-250^{O} F. Then increase temperature in the cooling compartment 25^{O} F every half hour until 600^{O} F temperature is attained. Maintain this temperature for at least 24 hours. When the cooling compartment has dried out, increase the temperature so that 600^{O} F is maintained in the freeboard of the calcining compartment for at least another 24 hours. Check the circumference of the belly band and if all areas are warm to the touch raise the temperature in the calcining compartment at the same rate - 25^{O} F every half hour.

After the 24 hours of calcining compartment curing has been accomplished, increase the Preheat Burner firing rate again so that a 50^{O} F per hour increase is achieved in the hot wind box beneath the preheat dome. At 600^{O} F hot wind box temperature, hold for 24 hours. The preheat compartment spray system should be activated to hold the preheat compartment temperature below 300^{O} F.

The completes the curing. The detailed startup procedures in the following section should be followed with the addition of the starting bed. Remember to replace the vent caps in the roof.

B. <u>Detailed Startup Procedures</u>

For a normal startup after the refractory has been cured the following procedures are followed:

1. Start water flow to scrubbers and adjust to desired rates.
2. Start Exhaust Fan, and adjust air flow to desired rate.

3. Start aftercooler fluidizing blower and adjust air flow to desired rate with the aftercooler exhaust gas damper open.
4. Adjust exhaust fan damper in calciner outlet gas duct to provide 1 to 2 inches water gauge suction in preheat compartment freeboard. Throughout the startup period re-adjust the damper to hold this range.
5. Adjust aftercooler exhaust gas damper to maintain aftercooler freeboard pressure slightly above hot wind box pressure. Re-adjust as required during the startup.
6. Add starting bed to preheat compartment.
7. Please refer to Preheat Burner instructions and Preheat Burner Piping Diagram.
8. Light preheat burners on low fire and maintain low fire position until freeboard temperature in each compartment underneath a dome is stabilized. Raise the temperature in the cooling compartment 50° F, per hour to 600° F and hold there for 12 hours. Check the circumference of the belly band, and if all areas are warm to the touch, raise the calcining compartment temperature 50° F an hour to 600° F and hold for 12 hours. Finally, the hot wind box temperature is raised in a similar manner.
9. As firing rate is increased, the preheat compartment spray system should be activated to hold preheat compartment temperature below 300° F with the water spray.
10. When calcine temperature points reach 600° F, start transferring rock from preheat compartment by manual control of transfer valve. Also add additional feed to preheat compartment to maintain preheat bed depth at 24" as indicated by bed depth gauge. Reading should equal 16" W.C..

11. At this point, there may be a spread in temperatures in the calcining compartment either before or during the addition of bed. When a sufficient bed depth is reached all thermocouples will be immersed and the situation will correct itself.
12. Add bed rapidly to a depth of 20" as shown by calciner bed depth gauge. Adjust feed and transfer rate to reach a bed depth of 40" W.C. when bed temperature reaches 1000-1100° F.
13. Continue adjusting exhaust damper to produce 1 to 2 inches suction in Preheat Compartment freeboard.

    Adjust aftercooler exhaust gas damper as required to maintain aftercooler pressure above hot wind box pressure.
14. Continue to maintain preheat compartment temperature at 220° F with spray water control and "HOT" cyclone temperatures at 1100° F. At no time should preheat temperature exceed 400° F.
15. Adjust aspirating air discharge valve to provide about 2500 SCFM aspirating air flow.
16. Start feed conveying system to refill feed bins.
17. Start product conveyors and cyclone rotary valves.
18. Start flow of rock feed at lowest rate possible and gradually increase at intervals, simultaneously start transfer from calcine to cooler compartment and begin slow discharge to aftercooler. Maintain aftercooler's temperature between 250° F and 300° F by spray quench water adjustments.
19. During this time, the calcining temperature should be controlled at 1450° F by increasing fuel rate to bed guns.
20. When preheat compartment bed depth is maintained at 24" W.C. switch preheat bed depth controller to "AUTO".

21. When the calciner bed depth is maintained at 50" W.C. and cooling compartment bed depth is maintained at 24" W.C. by balancing the incoming feed with product discharge switch calcining bed depth controller and cooling compartment bed depth controller to "AUTO".
22. When fuel rate has been adjusted to maintain proper calcination bed temperature, switch instrument to "AUTO".
23. When aftercooler temperature has been stabilized at 250° F and aftercooler bed depth has stabilized at 30" W.C., switch cooler recorder controller to "AUTO".

Normal Operation

A. Normal Operating Adjustments

In the Phosphate rock calcination system, the critical operating parameters are controlled automatically. However, a few controls on the cooling and calcination systems are manually set and adjusted by the operator at established predetermined operating levels.

1. Calcining System

   The only operator adjustments required in this system are the fluidizing air rate, preheat water sprays, aspirating air rate and feed rate. The flow rates are set to maintain proper fluidizing velocities within the Reactor and proper excess air for complete combustion of the fuel. The Reactor capacity (and thus the fuel rate to the Reactor) is merely controlled by increasing or decreasing the feed rate and air rate to maintain sufficient excess air. All other control points such as bed depth levels, and calcining bed temperatures will automatically be controlled by instrumentation.

2. **Cooling System**

Operator adjustments will be required to maintain fairly constant air rates to the aftercooler. Temperature control and bed depth of the aftercooler will be automatically controlled.

B. Data Recording

There are numerous indicating instruments in the entire system on the panel board. These are to assist personnel in the operation of the plant. In order to make full use of these instruments and also obtain operating history of the plant, daily log sheets should be kept by the operators. These sheets should contain spaces to record all the systems' temperatures and pressures, in addition to air, gas flow, and other measured parameters on the panel boards. Space should also be provided to log any unusual occurrences that may have taken place.

Having the operator maintain daily log sheet also serves to keep the operator alert and insures that he is checking the panel.

C. Normal Problems, Troubleshooting, and Corrective Action

1. **Pressure Taps**

With the two sets of pressure taps furnished, troubleshooting is comparatively easy. The difference between any two adjacent pressure taps in the system's pressure gauge must equal the differential gauges which control Reactor levels for the same points. It would normally be expected that when a tap plugged, it could not get the pressure impulse and would drop to a lower or zero value. This is not the case, however, since each tap is supplied with purge air which will force the motor reading off either of two ways.

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Conda Phosphate Operations

NORTH CALCINER JOB DESCRIPTION

A-OPERATOR RESPONSIBILITIES

The A-Operator is responsible for the safe, efficient operation of the Calciner and dryer for the duration of his shift. It will be his responsibility to see that the Calciner is operated in accordance with normal operating parameters included in this manual.

Listed below are some standard operating procedures that are done on a routine basis:

1. The A-Operator will take hourly readings from the board and will record these on log sheets. All readings required on the log sheet that are taken outside of this control room will be taken by the B-Operator.

2. In order to maintain proper temps in the Calciner, a mixture of dry and wet feed is needed. It will be the A-Operator's responsibility to adjust dry as needed, but to maintain the lowest setting as possible and still maintain proper preheat temps.

3. On Monday of each week, the A-Operator will switch internal transfer valves. This insures that both transfer valves are in good working condition.

4. The A-Operator is responsible for unit housekeeping.

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Conda Phosphate Operations

Dorrco FluoSolids Phosphate Rock Calcination System
Operating Instructions

STARTUP PROCEDURE - GENERAL

Startup of the calcination system involves preheating the calcination Reactor, and starting beds, to operating temperatures. Concurrently, the associated equipment must also be started so that rock is available for the calcination Reactor when operating temperature is attained.

A starting bed of dry rock is added to the preheat compartment and with fluidizing air passing through the Reactor, preheating is begun with the preheat burners located in the cooling compartment of the Reactor. As the firing rate is increased, the preheat temperature is held at 500° F maximum by water spray in the preheat compartment. When the air temperature in the calcining compartment approaches 600° F , the starting bed of rock is transferred to the calcining compartment and additional rock added to the to the preheat compartment. Heating is continued with the preheat burner until the calcining bed temperature reaches the auto ignition temperature of the bed fuel and 1350° F for natural gas. At this time, the fuel guns are inserted in the calcining compartment and heating is continued by direct bed fuel burning. The preheat burner, having served its function, is now turned off. Preheating is concluded when the calcining bed is heated to calcination temperature. At this time, rock feed is started to the Reactor and continuous operation of the Reactor has commenced. Hereafter, calcining compartment temperature will be controlled by the fuel rate and preheat compartment temperature controlled by water spray or feed addition. When the volume (or bed level) of the preheat and calcining compartments reach a predetermined level, transfer to the cooling compartment and product removal from the Reactor is started.

The cooling system is started when the cooling compartment's bed volume is approaching the predetermined bed level. At this time, the cooler fluidizing blower is adjusted to design flow rate. Feed to this system is begun by manually opening the transfer valve from the Calcining Reactor. Adjustment of the hot rock transfer rate, fluidizing air and spray water is made to maintain the cooler bed and cyclone dust collector operating temperature at about 250° F.

Final adjustments of all process parameters are then made to obtain complete integration of the calcining and cooling systems so that both systems act as one continuous operating unit and all control instruments can be switched to automatic control.

CAUTION: During periods of start-up it is important that the preheat compartment temperatures do not become excessively high. Temperatures above 600^{0}F can be detrimental to the carbon steel components, the exhaust fan in particular. To hold this temperature down, the preheat bed spray system should be activated to open the water valves allowing spray water to enter the system. In the event that this does not correct the situation, it will be necessary to put the feed system into operation.

SPECIFIC START-UP INSTRUCTIONS

A. PRELIMINARY START-UP CHECK-OFF LIST AND PREPARATIONS

1. Energize instrument panel and all electrical components at the motor control center by closing all of the following switches:
   - Calciner Feed Conveyors and Feeder
   - Calciner Exhaust Fan
   - Calciner Fluidizing Blower and Aux. Lube Oil Pump
   - Aspirating Air Blower
   - Cooler Fluidizing Blower
   - Scrubber Effluent Pump
   - Aftercooler Cyclone Gate Valve
   - Fuel Oil Pumps (If operating on stand-by fuel).
2. Check and adjust instrument air supply to 60-80 psig.
3. Check and adjust instrument air supply to all controllers and operators to 20 psig.
4. Adjust all purge air valves to all pressure taps, sight glasses. (Fluidizing Blowers must be running).

A. PRELIMINARY START-UP CHECK-OFF LIST AND PREPARATIONS (CONT.)

5. Set all manual loading stations on panel board to 0 psig.
6. Set all automatic controllers on panel board to "MANUAL." Also, set all output pressures to 0 psig.
7. Adjust all set points on automatic controllers to predetermined readings.
8. Make sure the following materials are available:
   a. Feed bins full
   b. Fuel, gas, and water

It is hoped that the eventual plant operators will have been chosen and indoctrinated with a number of short sessions over a period of several weeks in the general ideas of fluidization, plant flow, interlocks of the system, functions of each piece of equipment and reactions in the system should any one piece of equipment fail, or fail to function properly. While this may seem a large order, an operator's function is to take the proper corrective action when unusual conditions arise. Only an alert, well-informed, and confident individual can fulfill these requirements.

9. *At initial start-up, dry out refractory.*

   Allow at least 48 hours for the procedure described below.

   a. With all manhole covers open, air dry Reactor for at least 24 hours.
   b. Close all manhole covers, start exhaust fan and fluidizing blowers and blow air through Reactors (with no heat) for at least 12 hours. Check all motors and equipment for proper rotation.

c. With exhaust fan and fluidizing air blower "ON", and water flowing in scrubber, ignite preheat burner at minimum flame (refer to Preheat Burner Instructions) and increase temperature in cooling compartment 50^{0} F per hour until 500-600^{0} F temperature is reached. Maintain this temperature for at least 12 hours. When the cooling compartment as dried out, increase the temperature so that 500-600^{0} F is maintained in the freeboard of the calcining compartment for at least another 12 hours. Shut system down or proceed to Part B.

B. Detailed Start-Up Procedures

1. Start exhaust fan and calciner fluidizing air blower and adjust air flow to desired rate. Also start aspirating air blower.
2. Start cooler fluidizing blower and adjust air flow to desired rate.
3. Start water flow to scrubber and adjust to desired rates.
4. Adjust exhaust fan damper in calciner outlet gas duct to provide 1 to 2 inches water gauge suction in preheat compartment freeboard. Also adjust damper in aftercooler outlet gas duct to provide 1 to 2 inches water gauge pressure in aftercooler free board above calcining compartment freeboard pressure. Throughout the start-up period re-adjust the dampers to hold this range.
5. Add starting bed to preheat compartment.
6. Refer to Preheat Burner instructions and Preheat Burner Piping Diagram.
7. Light preheat burners on low fire and increase 50^{o} - 100^{o} F/hour until cooling compartment thermocouple register 100^{o} F. Hold at this point until calcine bed temperature reaches 600^{o} F calcine bed temperature .
8. As firing rate is increased, the preheat compartment spray system should be activated to hold preheat compartment temperature below 500^{o} F with the water spray.
9. When calcine temperature points reach 600^{o} F, start transferring rock from preheat compartment by manual control of transfer valve. Also add additional feed to preheat compartment to maintain preheat bed depth at 24" W. C. as indicated by bed depth gauge. Reading should equal 16" W. C..
10. At this point, there may be a spread in temperatures of the calcine compartment either before or during the addition of bed. When a sufficient bed depth is reached all thermocouples will be immersed and the situation will correct itself.
11. Add bed rapidly to a depth of 20" as shown by calciner bed depth gauge. Adjust feed and transfer rate to reach a bed depth of 40" W. C. when bed temperature reaches 1350[-1400]^{o} F.

B. DETAILED START-UP PROCEDURES (cont.)

12. Keep adjusting exhaust damper to produce 1 to 2 inches suction in Preheat Compartment freeboard, also adjust after-cooler exhaust damper to maintain 1 to 2 inches differential pressure between aftercooler freeboard and calcining compartment freeboard.
13. When bed temperature reaches 1350° F (1200° F if using No. 2 oil), with a depth of 40", start bed gun firing system at minimum rate.
14. When bed burning has been established, as indicated by a rapid rise in temperature, cut off preheat burner. This is done by slowly reducing the fuel rate to the burner so that a slow, not rapid, cooling takes place in the cooling compartment. This is to avoid shock cooling of the calcining constriction arch.
15. When proper bed burning of the gas is verified, adjust the fluidizing air to design flow and raise the fuel rate, evenly distributed to guns, to maintain steady temperature increase. Continue feeding make-up feed (for starting bed) until a final calcine compartment bed depth of 50" W.C. is reached.

    CAUTION: Adjust bed addition rate so that the bed temperature does not go below 1350° F. (1200° F if using No. 2 oil).
16. Continue to maintain preheat compartment temperature at 450° F with spray water control. At ***no time*** should preheat temperature exceed 600° F.
17. Start feed conveying system to refill feed bins.
18. Start product conveyors and cyclone rotary valves.
19. Start flow of rock feed at lowest rate possible and gradually increase at intervals, simultaneously start transfer from calcine to cooler compartment and start slow discharge to spray cooler. Maintain cooling system's temperature between 250° F and 300° F by spray quench water adjustments.
20. During this time, the calcining temperature should be controlled at 1500° F by increasing fuel rate to bed guns while maintaining 3 to 4% oxygen in stack gases.

B. DETAILED START-UP PROCEDURES (cont.)

21. When preheat compartment bed depth is maintained at 24" W.C. switch preheat bed depth controller to "AUTO".
22. When the calciner bed depth is maintained at 50"W.C. and cooling compartment bed depth is maintained at 24" W.C. by balancing the incoming feed with product discharge switch calcining bed depth controller and cooling compartment bed depth controller to "AUTO".
23. When fuel rate has been adjusted to maintain proper calcination bed temperature, switch instrument to "AUTO".
24. When cooling Reactor temperature has been stabilized at 250 ^{0} F and cooling Reactor bed depth has stabilized at 30" W.C., switch cooler recorder controller to "AUTO".

NORMAL OPERATION

A. NORMAL OPERATING ADJUSTMENTS

In the Phosphate rock calcination system, the critical operating parameters are controlled automatically. However, a few controls on the cooling and calcination systems are manually set and adjusted by the operator at established predetermined operating levels.

1. Calcining System

The only operator adjustments required in this system are the fluidizing air rate, exhaust fan suction, preheat water sprays and feed rate. The flow rates are set to maintain proper fluidizing velocities within the Reactor and proper excess air for complete combustion of the fuel. The Reactor capacity (and thus the fuel rate to the Reactor) is merely controlled by increasing or decreasing the feed rate and air rate to maintain sufficient excess air. All other control points such as bed depth levels, and calcining bed temperatures will automatically be controlled by instrumentation.

NORMAL OPERATION (cont.)

A. NORMAL OPERATING ADJUSTMENTS(cont.)

2. Cooling System

Operator adjustments will be required to maintain fairly constant air rates to the spray cooler. Temperature control and bed depth of the spray cooler will be automatically controlled.

B. DATA RECORDING

There are numerous indicating instruments in the entire system on the panel board. These are to assist personnel in the operation of the plant. In order to make full use of these instruments and also obtain operating history of the plant, daily log sheets should be kept by the operators. These sheets should contain spaces to record all the systems' temperatures and pressures, in addition to air and fuel flow, and other measured parameters on the panel boards. Space should also be provided to log any unusual occurrences that may have taken place.

Having the operator maintain a daily log sheet also serves to keep the operator alert and insures that he is checking the panel.

Area 2 - East Sulfuric Acid Plant

Startups and shutdowns of the sulfuric acid plants may result in excess emissions, due to lack of or loss of critical operating temperatures which ensure proper control of emissions from the plants. When the critical temperatures are reached, emissions return to previously controlled levels. Procedures to minimize excess emissions are written into the policy of operational startup of the plants.

The excess emissions are SO_2 and/or acid mist which may exceed visible emissions limitations specified in IDAPA 16.01.01.625 (ie; 20% opacity by VE). Upsets/breakdowns and scheduled maintenance shutdowns are reported to the Department in accordance with IDAPA 16.01.01.130 -135.

The information required at IDAPA 16.01.01.314.03 is as follows:

(03.a) The equipment identified as the East Sulfuric Acid Plant can be cross-referenced as S-Se-1 and S-Se-2 in this application.
(03.b) The specific pollutants likely to be emitted in excess of applicable standards are SO_2 and SO_3 /acid mist.
(03.c) The estimated amount of excess emissions expected to be released during each event would be extremely difficult to quantify, but the term 'excess' implies greater than the emission limit. (03.d) The expected duration of each excess emissions event would depend on the individual circumstances of each event.
(03.e) Efforts to minimize the amount and duration of each excess emissions event will be maintained. Excess emissions may be unavoidable for any of the three types of excess emissions events: startup, shutdown, and scheduled maintenance, because the pollution control devices associated with this equipment are essential to its operation.
(03.f) The frequency at which the three types of excess emissions events are expected to occur cannot be specified.
(03.g.i) Scheduled maintenance is needed when the operating equipment is not functioning properly, or when pollution control equipment is not functioning properly.
(03.g.ii) Scheduled maintenance is usually performed during periods when operation of the emissions unit or other sources has been reduced or ceased. Maintenance to the equipment usually cannot be affected without reducing or ceasing operation.
(03.g.iii) Maintenance is scheduled to minimize downtime, minimize excess emissions; to optimize performance of the equipment and control devices, and maximize on-stream time. Good engineering practices are followed when performing scheduled maintenance.
(03.g.iv) Where applicable, it may be necessary to by-pass, take off line, or operate pollution control equipment at reduced efficiency while maintenance is being performed in order to prevent greater excess emissions from occurring if the entire process were shut down.
(03.g.v) Auxiliary air pollution control equipment is not applicable to this equipment.
(03.h) Good engineering practices are followed relative to this equipment. Modifications and redesign are pursued when they are efficacious.
(03.i) Detailed specification of the procedures to be followed by the owner or operator which will minimize excess emissions at all times during startup, shutdown, and scheduled maintenance follow this section.

STARTING PLANT UP
(AFTER 6 HOUR DOWN TIME WITH ACID CIRCULATING THROUGH THE TOWERS)

1. Check and remove any locks that may have been put on while plant was down.
   NOTE: If any lock is left on and the person of which it belongs to has left the premises, follow the CPO Safety Handbook Policy of removing this persons lock out/tag out devise.

2. Let people around and in the area know that you are getting ready to start up.

3. Set all dampers for start up
   A. BV#1 100% open
      NOTE: located on sulfur gun deck to the south (chain valve).
   B. BV #2 100% open
      NOTE: located on West side of #1 Boiler First chain valve to the South
   C. BV#3 25% open
      NOTE: located on the west side of #1 Boiler first chain valve to the North
   D. BV#4 25% open
      NOTE: located on the North end of #2 Boiler.
   E. BV#5 25% open
      NOTE: located on the east side in the center of #2 Boiler.

4. Check the sulfur guns and make sure they are hot and ready.
   (Refer to JSA # 62 for safety considerations)
   NOTE: To do this use a piece of waste sulfur and rub it on the lines to the sulfur gun if it melts and turns to liquid as you rub it on the pipes they are hot enough to keep the sulfur in the line liquid. This means the guns are hot enough to start the flow through them.

5. Check out the French Blower.
   A. make sure the oil temperature is up to at least 125° F to 130° F for start up.
   B. make sure breaker is unlocked and turned on.
   C. make sure the louvers are closed for start up.

6. When you have checked everything out and are ready to start up notify the North Plant, Phos, and DAP to let them know that you are starting up.

7. Put oil cooler in service on the French Blower.
   A. open inlet valve to the oil cooler
   B. close the bypass valve

8. Start French Blower up
   A. Push the start button (button is located on the east wall in the North east

corner of the French Blower shack).

B. reset vibration trips on French Blower motor. (located on the East side of the blower north and south ends about knee high).

C. put Auxiliary lube oil pump on auto by switching the switch from "Hand" to "Automatic". (switch is located on the east wall in the North east corner of the French Blower shack).

D. open up on the louvers about ¼ way.

9. Start sulfur pump (start button is located on the Control panel in the control room)
   A. adjust sulfur to about 14 gallons to start heating up the plant.

NOTE: When you get your steam pressure up to 230# -240# then start main blower.

10. To start the Main Blower
(Refer to JSA # 71 for safety considerations)

NOTE: Make sure the trip button on the tachometer box has been reset before opening Inlet Steam valve.

A. open the Inlet steam valve slowly to get the blower rolling
B. keep opening steam valve to bring the Main Blower up to 2000 rpm.
C. start adding more sulfur to heat plant up.
D. Start adjusting bed dampers to get the bed temperatures up to where you want to run them.
E. adding sulfur and raising blower (by adjusting governor clockwise) as needed to get the plant heated up and lined out.
F. watch the SO_2 monitor that you do not go over your limits as you are getting heated up.
G. adjusting bed dampers as needed until you get all the bed temperatures up to operating temperatures.

NOTE: Watch acid temperatures. When they get up into range.

H. Start putting acid through acid coolers by:
   a. closing back on the bypass valves.

NOTE: Keep an eye on everything temperatures, sulfur flows, SO_2 monitor, etc.

11. Start adding dilution water to 98% and Tailgas Acid Tanks to get the acid strength lined out.

NOTE: Water valves for dilution of acid in 98%, Tailgas, and 93% Acid tanks are located on the main control panel in the control room.

12. When you have all the bed temperatures up and acid temperatures up, everything is looking pretty good:

A. Raise the Main Blower up to 4200 rpm. Keep
B. bringing sulfur up. (Full rates for 4200 rpm and 1900 ^{0}F is about 42 gpm)

NOTE: You should now be on full rates.

C. line your Sulfur Burner out at 1900^0,
D. Main Blower on 4200 rpm.
E. adjust all beds to your operating temperatures.

OPERATOR DUTIES

A OPERATOR: 1, 2, 3, 3A, 3B, 3C, 3D, 3E, 4, 5, 6, 8D, 9, 9A, 10C, 10D, 10E, 10F, 10G,
11, 12B, 12C, 12D, 12E.

B OPERATOR: 7, 8, 8A, 8B, 8C, 10, 10A, 10B, 10H, 10Ha, 12A, 12D.

ROUTINE SHUTDOWN

NOTE: Notify North Plant, Phos Acid, and DAP 10 to 15 minutes prior to intended shutdown.

1. Shut sulfur off at the panel board.
   NOTE: Button is located in the lower middle of the control panel in the control room.

2. Reduce Main Blower to 2000 rpm.
(Refer to JSA# 71 for safety considerations)
   NOTE: Governor is located on the platform that is built around the Main blower. Walk up the stairs on the East side of the platform and the governor is on the East end of the Main Blower.
   NOTE: Reduce the speed of the blower by turning the knob on the governor of the blower counter clockwise and watching the speed on the tachometer on your left as you face the governor.
   A. Switch the auxiliary lube oil pump from "Automatic" to "Hand".
      NOTE: Below 3000 rpm the oil pump must be switched to manual. It is located to the left of the governor (as you face the governor) against the handrail to the south.
3. Blow through to purge the system of excess gas.
   A. Allow the burner temperature to drop to 1250^0 to 1300^0 F.
      a. Turn governor down (counter clock wise)to Zero position the scale

4. Block in all three dilution water lines. (98%, Tailgas, and 93%).
   NOTE: Located on the Control Panel in the control room

5. Close 98% to 93% auto transfer valve.
   NOTE: Located on the control panel in the control room).

6. Switch the 93% tank level controller to manual and open wide open
   NOTE: Located on the control panel in the control room.

7. When 93% tank has pumped empty,
   (Refer to JSA# 19 for safety considerations)
   A. shut down and secure the 93% transfer system.
      a. shut 93% transfer pump off.
         NOTE: Shut off Button located on S. W. Drying Tower Leg.
      b. Close auto valve (on the control panel in the control room).
      c. Close Drying Tower drain leg (93% Tank inlet) block valve.
      d. Close 93% pumps discharge valve.

8. When burner reaches the above temperature (1250^0 to 1300^0 F) shut down and secure the main blower.
(Refer to JSA # 71 for safety considerations)

A. close steam discharge chain valve.
NOTE: located on the South side of the Main Blower.
B. open the steam bleeds on the steam line and blower

9. Refill both boilers to operating levels
A. Open auto valve to Boiler Feed water Supply pumps for each boiler (#1 and #2 WH Boilers).
NOTE: Located on the control panel in the control room.

10. Shut down boiler feed water pumps (BFW).
A. Set back up Boiler Feed Pump switch to off position.
NOTE: Switches for pumps are located on the East side of each pump in the water treating room (back room)
B. Set pump that is running to off position.

11. Shut down and secure booster blower (French Blower).
A. Push the stop button.
NOTE: Located in the North East corner of the French Blower Building.
B. Switch the auxiliary lube oil pump from "Automatic" to Hand.
NOTE: Located in the North East corner of the French Blower Building
C. Open the bypass on the oil cooler and close the inlet valve to the cooler.
NOTE: Located on the North side of the oil reservoir which is to the North East of the French Blower Building.

12. Switch #1 (both TIC 109 And TIC 131) and #2 (TIC 119) acid cooler temperature control valves to manual and open 100%.
NOTE: Located on the New Control Panel West end of Old Control Panel in the control room
NOTE: TIC 109 is #1 Absorbing Tower Controller, TIC 131 is The Drying Tower Controller and TIC 119 is The #2 Tower Controller.

13. Close #1 and #2 cooler discharge valves.
(Refer to JSA# 22 for safety considerations)
NOTE: Located on the Acid Cooler deck East end of coolers.

14. Shut down cooling fans.
A. Switch all fans running to off position on each switch.
NOTE: Switches are located on the top deck of the Cooling Tower East side.
NOTE: Leave cooling water pumps running unless shut down is dictated.

15. Close all Dampers.
A. #1 Damper Closed 100%
B. #2 Damper Closed 100%
C. #3 Damper Closed 100%
D. #4 Damper Closed 100%
E. #5 Damper Closed 100%

!6. Close both Waste Heat (WH) Boiler continuous blowdown valves.
NOTE: #1 WH Boiler cont. Blow Down valves located about in the middle of the boiler and to the East.
NOTE: #2 WH Boiler cont. Blow Down valve is located on the North-west end of the boiler.

17. Close Cooling Tower blow down valve.
NOTE: Located on the North West corner of the old cooling basin by the sump pump.

18. Shut off the Anodic Protection System for all three acid coolers.
NOTE: Located in the Anodic protection MCC. (West of the Cooling Tower).
A. Switch each Cooler to off on the control panel.
NOTE: Located on the South Wall of the MCC

OPERATOR DUTIES

A OPERATOR: 1, 3, 3A, 4, 5, 6, 7b, 9A, 10, 10A, 10B, 12, 15, 15A, 15B, 15C, 15D, 15E, 16, 17.

B OPERATOR: 2, 2A, 3a, 7A, 7a, 7c, 7d, 8a, 8b, 10A, 11A, 11B, 11C, 13, 14, 14A, 18.

POST POWER FAILURE EMERGENCY PROCEEDURES

NOTE: When power failure occurs, nearly all plant functions stop instantly. The following steps must be performed immediately to prevent safety, environmental, and operational catastrophes from occurring as a result from a sudden power loss and equipment shutdown.

NOTE: Where applicable, all plant policies concerning PPE and Safety procedures must be followed.

NOTE: Though the North Plant is capable of minimal operations on auxiliary power, most failures will take it down initially, resulting in the loss of instrument air supply. With out instrument air all East Plant pneumatic controllers will fail 100% open or closed, depending on application.

1. Close all tower acid circulation and acid transfer manual block valves to prevent system back drain and overflow of the acid pump tanks.

(Refer to JSA# 7 for safety considerations)

A. "A" Absorbing Tower pump discharge valve (#1 center tank, East pump).
B. "B" Absorbing Tower pump discharge valve (#1 center tank, Center pump).
C. Drying Tower pump discharge valve (#1 center tank, West pump).
D. North Tail gas pump discharge valve (#2 West tank. North pump).
E. South Tail gas pump discharge valve (#2 West tank. South pump).
F. 93% acid pump discharge valve (diluter tank, west tank, west side of the tank).
G. 93% acid recycle valve (diluter tank, west tank, east side of the tank).
H. 98% - 93% transfer block valve (3" between #1 and Diluter tank).

NOTE: Theses are the first priority steps to do.

2. Secure water treatment system and related equipment.
   A. Block in Raw water feed lines to both demineralizers.
   B. Block an all three dilution water lines to prevent any further dilution in acid strength.
   C. Close both boiler continuous blow down valves.
   D. Block in Cooling Tower acid feeder control valve.
   E. Manually block and dump both return condensate lines from Phos Acid.
   F. Block D. A. tank level controller.
      NOTE: North Plant will need our D. A. Water and "B" deminerlized water pump to restart B-5 Boiler.

NOTE: These are the Second priority steps to do.

3. Conserve system heat to speed up plant restart time and to minimize emissions.
   A. Close Damper #1 through #5 including 3A.
      a. #1 damper (Sulfur burner inlet)
         NOTE: located on sulfur gun deck to the south (chain valve).
      b. #2 damper (#1 Boiler bypass)

NOTE: located on West side of #1 Boiler First chain valve to the south).

c. #3 damper (#1 Boiler outlet)
NOTE: located on the west side of #1 Boiler first chain valve to the North.

d. 3A damper (#1 Converter Bed inlet)
NOTE: located on the west side of #1 Boiler center chain valve.

e. #4 damper (#2 Boiler outlet)
NOTE: located on the North end of #2 Boiler.

f. #5 damper (#2 Boiler bypass)
NOTE: located on the east side in the center of #2 Boiler.

B. Bulk head #1 Boiler
(Refer to JSA# 44 for safety considerations)
NOTE: Bulk head valve is located on top of #1 Boiler to the South end.

C. Bulk head #2 Boiler.
NOTE: Bulk head valve is located on top of #2 Boiler to the South end.

NOTE: These are the Third priority steps to do.

4. Secure all the Automatically restart equipment.
   A. Switch Booster Blower (French Blower) auxiliary lube pump to "Hand".
      a. Bypass oil cooler
         NOTE: Open the bypass on the oil cooler and close the inlet valve to the cooler. Located on the North side of the oil reservoir which is to the North East of the French Blower Building.
   B. Switch main Blower auxiliary lube oil pump to "Hand"..
      NOTE. Though the Terry Turbine is not considered an Automatically restart equipment, it is recommended that the governor control be reset to zero and the main steam inlet valve be closed as a back up.
      NOTE: Governor is located on the platform that is built around the Main blower. Walk up the stairs on the East side of the platform and the governor is on the East end of the Main Blower.
   C. Switch off the power control to acid and caustic metering pumps.
      NOTE: Any water units and related metering pumps in regeneration cycle when power failed will automatically pick up where they were when power is restored.

NOTE: 5. Be aware of current weather conditions and react accordingly:

   A. During warm weather the plant can set idle for several hours without adverse affect.
   B. During sub-zero weather, assuming the plant will be down 30 minutes

or longer, special consideration must be given to any and all equipment that may freeze.

a. Any small piping (3" or less) containing 98% acid
b. Any exposed water piping not steam traced, including return condensate .
c. Any steam piping, tracing, etc.(in the event that B-5 Boiler is down).
d. Strong cold winds against elevated pipe racks will cool sulfur feed system faster than normal condensate- loading the steam jackets and promoting early freeze ups.
e. Drain any lines that are practical to do so and can be done safely.
f. All non-drainable systems should be flushed every 30-60 minutes to keep material moving and minimize freezing.

NOTE: As soon as B-5 Boiler is back on line, bring sulfur feed line steam pressure, key steam systems, and tracing back up to as near normal pressure as possible .

NOTE: Monitor plant conditions closely and continuously.

A. Since no instruments except direct- reading mechanical pressure gauges will function, frequently visual inspection is mandatory.

OPERATOR DUTIES:

A OPERATOR: 1A, 1B, 1C, 1D, 1E, 1F, 1G, 1H, 2A, 2B, 2C, 2D, 2E, 2F, 3A, 3Aa, 3Ab, 3Ac, 3Ad, 3Ae, 3Af, 3B, 5a, 5f.

B OPERATOR: 4A, 4Aa, 4B, 4C, 5e

SHUTTING EAST SULFURIC DOWN
(FOR TURNAROUND)
(Acid circulating through towers)

Shane T. Passey
12/20/99

1. Notify: North plant, Phos Acid and DAP that you are shutting the plant down for turnaround.

2. Shut off the sulfur feed pump.
   (Refer to JSA # 62 for safety considerations)
   A. Open sulfur feed auto controller to 100%.
   B. Open manual block valves on all three sulfur guns 100%.
   C. Close #1 98% and #2 98% auto control valves 100%.
      Note: this will stop all transfer of acid from one tank to the next or to storage.
   C. Open 93% control valve 100% and pump tank empty.

3. Shut down Anodic Protection System(APS) for all three acid coolers when acid in each cools to 150 degrees.
   A. Turn each individual on/off switch to the off position.
      NOTE: Located in the new Motor Control Center (MCC) in the south east corner of the plant.
   B. Turn off each individual power control unit to the APS control panel.

4. Shut down 93% transfer system
   (Refer to JSA # 8 for safety considerations)

   A. Shut down 93% acid transfer pump. (push button located on start/stop station beneath drying tower.
   B. Close 93% acid transfer pump discharge valve. (located on top of 93 % acid tank and west of pump.
   C. Close #1 98% to 93% acid transfer valve (located on the south side of the drying tower at the part bottom, you will access it from on top of the platform deck)

5. Shut off #1 98%, #2 98% and 93% acid dilution water valves.
   A. Open drain valves for each .
   B. Purge lines with air

6. Shut down cooling tower system
   A. Shut down cooling tower circulation pumps (2 running)
      NOTE: Push off buttons for each at start/stop station located at ground level directly south of "A" cooling pump.
   B. "Throw" switch gear for each pump to the off position .
      NOTE: Located in the new Motor Control Center (MCC) in the south east corner of the plant and on the north wall. All pumps are marked accordingly. (A,B and C cooling pumps)
   C. Shut down cooling fans (2 running)
      NOTE: Start/stop/speed and directional switches are located on cooling tower deck, one for each fan, east of each fan nozzle.
      aa. Rotate each switch to the "off" position.
   D. "Throw" switch gear for each motor to the "off" position.
      NOTE: Located in the new Motor Control Center (MCC) in the south east corner of the plant and on the north wall. Both fans are marked accordingly. (North and South)
   E. Block in (close) basin Make up water line (manual)
      NOTE: Located on the south side of the pump deck and west of the green automatic valve.
      aa. Notify the north plant that the make up water line has been closed.
   F. Close the basin acid injector pump manual block valve.
      (Refer to JSA # 27 for safety considerations)

NOTE: Located at the south west corner of the cooling tower at ground level.

aa. This will prevent any acid being injected into the cooling tower basin while plant is down.

7. Shut down cooling tower chemical feed system.
(Refer to JSA # 33 for safety considerations)
NOTE: The chemical feed system is located in the bulk chemical storage building south of the cooling tower.
   A. Shut down the 8305 + chemical feed pump.
      NOTE: Unplug the cord to the yellow pump at ground level to the north of the bulk chemical tank. (east tank)
   B. Shut down the 23263 chemical feed pump.
      NOTE: Unplug the cord to the yellow pump at ground level and to the north of the bulk chemical tank. (west tank).

8. Decrease Main Blower rpm rate to 100" of discharge pressure (approx. 3600 rpm)
(Refer to JSA # 71 for safety considerations)
   A. To do this, simply rotate main blower governor controller counter clockwise, monitoring tachometer and discharge manometer until desired speed and discharge pressure are obtained
      a. A "helper " will be needed to monitor the discharge pressure manometer since it is in control room on the control panel. Tachometer is located on the main blower control deck to the east of governor controller.

9. Shut down 2000 hr. Booster blower.
(Refer to JSA # 57 for safety considerations)
   A. Switch aux. oil pump operation to manual
   B. Bypass oil cooler
   C. Open louvers 100%- control is located on control panel

10. Run Main blower here (100" and approx. 3600 rpm for 30 minutes to one hour)

11. Decrease Main Blower rpm rate to 25" of discharge pressure (approx. 2000 rpm)
(Refer to JSA # 71 for safety considerations)
   A. Maintain this speed for approx. 24 hours.
   NOTE: Governor control will likely be in the "0" position at this point.

12. Set all dampers for maximum cool down.
   A. BV#1- 100% open (note: this damper will already be 100% open since that is its position during operation.
      NOTE: Located on sulfur gun deck west end of sulfur burner. (chain operated)
   B. BV#2- 100% open
      NOTE: Located on west side, south end of #1 waste heat boiler.
   C. BV#3- 100% open.
      NOTE: Located on west side, north end of #1 waste heat boiler.
   D. BV#3A- 100% open.
      NOTE: Located on the discharge duct of #1 waste heat boiler
      note: this damper will already be 100% open since that is its normal position during operation.
   E. BV#4- 100% open.
      NOTE: located on the north end of #2 waste heat boiler.
   F. BV#5- 100% open.
      NOTE: Located on the east side of #2 waste heat boiler in the bypass duct between inlet and outlet duct of same boiler.
   G. BV#6- 100% closed

NOTE: Damper controller is located on control board west end.

H. BV#7- 100% closed.

NOTE: Damper controller is located on control board west end

note: The reason for these two dampers being 100% closed is for the fact that they are located in bypass ducts of the Hot pass and Cold pass heat exchangers. By closing them you are forcing the air flow through the vessels and not allowing any air to bypass the vessels, therefore aiding the cool down process.

13. Manually blow down both waste heat boilers every 2 hours. This will aide in cooling the boilers as well as the air flow to the rest of plant internals.
(Refer to JSA # 4 for safety considerations)
   A. A blow down during the cool down process can have a duration 2-3 minutes per boiler
      NOTE: Manual blow down valves are located at the south end of #1 waste heat boiler. The top valves are for #1 waste heat boiler. The bottom valves are for #2 waste heat boiler.
      NOTE: the proper way to blow down the boilers is as follows: Open knife valve slowly 100%, then open the wheel valve slowly 100%. Wait for the allotted amount of blow down time, then close the valves, wheel valve first, then the knife valve.

14. Monitor both boiler steam pressure gauges
(Refer to JSA # 4 for safety considerations)
   A. When steam pressure decreases to 150 psi. Close bulk head valves
      NOTE: Located on top of each boiler, there are 2 valves. The inside valve is the bulkhead, the outside is the non-return valve. Close both.
   B. When steam pressure decreases to 30 psi, Open the vent valves.
      NOTE: Located on top of both boilers, these are one inch valves and piping attached that will vent the remaining pressure from each boiler.

NOTE: BY FOLLOWING STEPS 1-11 YOU SHOULD OBTAIN MAXIMUM COOL DOWN OF THE INTERNALS OF THE ENTIRE SULFURIC PLANT.

PART TWO OF THE COOL DOWN PROCESS OF THE EAST SULFURIC PLANT
(AFTER 24 HOURS OF ENTIRE PLANT COOLING HAS BEEN COMPLETED)
(acid circulating through towers)

15. Notify North plant, Phos acid and DAP that you are shutting the main blower completely.

16. Shut down main blower
(Refer to JSA # 71 for safety considerations)
   A. Rotate main blower governor controller counter clockwise (slowly) all the way to the "0" setting, noting that the tachometer reading will stop declining around 2000 rpm.
   B. Switch main blower aux. oil pump to manual operation (switch is located directly south of the governor controller.
   C. Close chain operated high pressure steam inlet valve (slowly). This valve is located on the south side of the main blower. Operated from ground level.
   D. After valve has been closed completely, back the valve off slightly so it will not be as hard to open when needed.
   E. Monitor main blower shaft rotation until it stops completely.
   F. Lockout main blower high pressure steam inlet chain valve (wrap chain around the 2" post to the right of the chain with padlock and operators ID. Tag)

17. Install blank in the duct to #1 absorbing tower (located on the west side of the economizer on top of the 8' platform deck.
(Refer to JSA # 11 for safety considerations)
   A. Remove blank access cover plate (approx. 4"x4' plate)
   B. Slide the blank into the slot

NOTE: A double jack hammer may be required to properly seat the blank into place.
NOTE: Wear proper safety harness for above ground work.

C. Remove bottom east man way of economizer.
(Refer to JSA # 11 for safety considerations)
NOTE: A picker or fork lift will be needed as this door is heavy.

18. Re-start main blower.
A. Remove lockout padlocks
B. Notify North plant, Phos acid and DAP that you are re-starting main blower to continue cool down process of the "front end of the plant"
NOTE: From this point you will only be cooling the plant down from the sulfur burner to the economizer. All dampers left set as before.

19. Open high pressure steam chain operated valve slowly 100%.
(Refer to JSA # 71 for safety considerations)
NOTE: You will likely need assistance to do this since the valve is "stiff" at the beginning to get open.
A. The governor will likely not have to be operated to obtain 2000 rpm rate. However monitoring the tachometer and the discharge pressure manometer will tell for sure.
NOTE: An assistant will be needed to watch discharge manometer as it is located in control room on control panel.

20. Continue the cool down process as prescribed for approx. The next 24 hours.
B. Continual monitoring of all control panel gauges are essential during this time, paying attention to converter temps, beds 1-4, both boiler steam pressure gauges, water levels in both boilers.

AFTER COOL DOWN HAS BEEN OBTAINED

21. Shut down main blower.
(Refer to JSA # 71 for safety considerations)
A. Follow step #16

PUMP ALL ACID OUT OF PLANT
(Tanks, coolers and lines)
(Refer to JSA # 22 for safety considerations)

22. Lower levels of #1acid pump tank.
A. Close the manual block valve on the west pipe rack on the 93% transfer line to prevent transferring any acid backward to the cooler system.
B. Open 93% acid transfer valve (automatic) 100%.
NOTE: Located on the control panel
C. Close the transfer block valve (manual) from the #2 98% tank to the #1 98% tank.
NOTE: Located at the valve cluster on top of the cluster platform. North east valve.
D. Open the 98% to 93% transfer block valve (manual).
NOTE: Located directly west of the #2 98% transfer block valve.
E. Close the dump valve (manual) into the top of the #1 98% tank.
NOTE: located below valve cluster. (bottom valve).
F. Open coil drain block valve (manual)
NOTE: Located to the far south on valve cluster.
G. Start coil drain pump.
NOTE: Push button located on start/stop station beneath drying tower.
H. Open block valve (manual) on the west end of the #1 98% acid header piping (slowly) to allow acid to begin transfer. Valve should only be opened approx. ¼ or about 4 turns.
NOTE: The #1 98% acid header line is located at ground level and south of #1 98% acid

pump tank. The valve is located on the far west end of the header pipe.

I. Monitor transfer of acid through the 93% transfer line.
   A. Flow meter is located on the control panel.

J. Monitor acid level in the #1 98% tank.
   A. Acid level will begin to drop.
      NOTE: Level manometer is located on control panel and marked #1 98% pump tank level
   B. Continue acid transfer until approx. Level of 12"-15" is obtained.
      NOTE: Further transfer after 12"-15" will cause pumps to cavitate

K. Close manual block valve on the west end of #1 98% acid header line.
   NOTE: The reason for doing the above procedure is to make room in the tank for acid that is still circulating through the #1 absorbing tower as well as the drying tower after the circulation pumps are shut down.

23. Shut down "A" and "B" absorbing tower and Drying tower pumps.
    (Refer to JSA # 61 for safety considerations)
    NOTE: Push buttons (3)located at start/ stop station beneath drying tower.
    A. Monitor acid level in #1 98% tank until tank level increase subsides.
       a. 60" manometer reading is the approx. normal maximum high level of the tank. Tank level should not be allowed to exceed this or possible overflow can occur.
24. Shut down #2 98% acid pump
    (Refer to JSA # 61 for safety considerations)
    A. Push button on start/stop station located beneath drying tower.
       NOTE: Monitor #2 98% acid tank level manometer
       NOTE: Historically the #2 98% acid tank will hold the acid in the tank plus the acid that is being circulated through the tower when the pump is shut down,
25. Drain #1 98% acid cooler and lines
    (Refer to JSA # 22 for safety considerations)
    A. Follow steps 1- A-F
    B. Open cooler drain line block valve 100%. (located to the right of the steps at the north west corner of cooler deck at ground level)
    C. Open the bottom drain of the #1 98% acid cooler. (located in the middle of cooler and directly beneath.
    D. Open the drain legs of the cooler bypass piping. Located in the north west corner of cooler deck and between #1 and #2 acid coolers.
    E. Monitor acid transfer .
       NOTE: Acid flow meter is located on the control panel marked as such.
    F. Monitor coil drain pump amp meter.
       NOTE: located on control panel, east end toward bottom and marked as such) It should be pegged out or carrying maximum amp load.
       a. Acid transfer will be complete when the coil drain pump cavitates, indicated by the irratic swing back and forth on the amp meter.
26. Drain the #2 98% cooler and lines
    (Refer to JSA # 25 for safety considerations)
    A.. Follow steps 22-A-F
       NOTE: Step "D" pertaining to the #2 98% acid cooler is the same as the #1 98% cooler with the exception that the bypass drain legs are located between #2 98% and the 93% acid coolers.
    B. Shut down coil drain pump. (Push button located on start/stop station beneath drying tower.)

27. Drain 93% acid cooler
    (Refer to JSA # 30 for safety considerations)
    A. Follow steps 22-A-F
    B. Wait approx. 2-3 minutes for coil drain pump to put a suction on cooler

C. Open the gate valves on the inlet and discharge piping of the cooler slowly to allow air into the system and "break" the vaccum that will be present in its closed environment

D. Monitor coil drain pump amp meter and acid transfer meter on control; board as before

NOTE: As with the other cooler draining process, coil drain amp meter will cavitate indicating the vessel is empty.

28. Drain 93% acid transfer line from cooler discharge to manual block valve that was closed in step 1.A. (Refer to JSA # 19 for safety considerations)

A. Close cooler drain line manual block valve.

NOTE: Located to the right of the north west stairway to cooler deck at ground level (same one that was opened during step 2-B) This will prevent any acid from entering coolers that have already been drained.

B. Open 93% acid transfer line drain valve (manual) 100%

NOTE: Located just south of coil drain pump on acid line coming from main acid transfer piping.

C. Monitor coil drain pump amp and flow meter on control board as before.

D. Shut down coil drain pump when amp and flow meters indicates piping is empty.

29. Close all acid cooler drain valves and 93% transfer line valves.
(Refer to JSA # 22 for safety considerations)

NOTE: This will prevent any acid being drained from tanks to enter the coolers and associated lines. The following is a list of the valves that need to be closed at this time.

A. #1 98% acid cooler

a. close cooler drain (located in the center on cooler and beneath.)
b. close the bypass drain legs (located between #1 98% and #2 98% acid coolers)
c. close the drying tower bypass drain legs (located in the north west corner of the cooler deck.

B. #2 98% acid cooler
(Refer to JSA # 25 for safety considerations)

a. close cooler drain (located in the center of cooler and beneath)
b. close the bypass drain legs (located between #2 98% and 93% acid coolers and is the piping to the west)

C. 93% acid cooler
(Refer to JSA #18 for safety considerations)

a. close cooler bottom drain (located in the center of the cooler and beneath)
b. close the bypass drain legs (located between #2 98% and 93% acid coolers and is the east piping.

NOTE: The cooler system as well as its drain system is now be isolated.

30. Drain #1 98% acid tank
Refer to JSA # 22 for safety considerations)

A. Install drain hose to bottom drain valve of #1 98% acid tank, and the other end to the cam lock inlet port to of the coil drain system.

NOTE: Located just east of coil drain pump.

B. Open inlet port manual block valve 100%

C. Start coil drain pump

NOTE: Push button on start/stop station beneath drying tower.

D. Open #1 98% tank bottom drain valve slowly to 100%

Note: Be aware that this valve probably has not been operated for the past year, therefore its condition as far as any flanges, fittings etc. downstream of the valve could leak and cause personal injury and environmental concerns.

E. Monitor acid transfer, tank level manometer and coil drain pump amp meter.

a. Acid transfer should be complete when level manometer decline subsides and coil drain pump amp meter cavitates

b. Visually look inside #1 98% acid pump tank to ensure all the acid possible has been drained
NOTE: Open lid on man way located on top of the tank.
c. Close drain valve on the #1 98% acid tank
d. Close coil drain line inlet port manual block valve
e. Shut down coil drain pump
NOTE: Push button on start/stop station located beneath drying tower

31. Drain #2 98% acid tank
(Refer to JSA # 25 for safety considerations)
A. Install drain hose on the #2 98% acid tank drain valve and the other end to the cam lock inlet port to the coil drain piping.
B. Start coil drain pump
NOTE: Push button located on start/stop station beneath drying tower
C. Open coil drain inlet port manual block valve 100%
D. Open #2 98% acid tank drain valve slowly 100%
NOTE: Be aware that this valve also has probably not been operated for the last year, therefore its condition as far as flanges, fittings etc. downstream of the valve could leak and cause personal injury and/or environmental concerns.
E. Monitor #2 98% acid tank level manometer and coil drain pump amp meter for acid flow through the transfer line and tank level decline.
NOTE: When tank level manometer and coil drain pump amp meter cavitates indicating tank is empty, do the following.
F. Remove the man way lid and inspect interior to see that all that is possible has been removed.
NOTE: Located on top of #2 98% acid tank.
G. Close #2 98% acid tank drain valve.
H. Close coil drain inlet port block valve.
I. Shut down coil drain pump.
NOTE: Push button on start/stop station located beneath drying tower.

32. Drain 93% product tank
(Refer to JSA # 18 for safety considerations)
A. Install drain hose on the 93% acid tank drain valve and install the other end to the coil drain inlet port manual block valve.
B. Start coil drain pump
NOTE: Push button on start/stop station located beneath drying tower.
C. Open coil drain inlet port manual block valve 100%
D. Open 93% acid tank drain valve 100%
NOTE: This valve has probably not been operated in the past year, therefore its condition as far as flanges, fittings etc. downstream of the valve could leak and cause personal injury and/or environmental concerns.
E. Monitor 93% acid tank level manometer and coil drain pump amp meter for acid transfer and tank level decline.
NOTE: When 93% acid tank level manometer and coil drain pump amp meter cavitates indicating that tank is empty, do the following:
F. Remove the man way lid and inspect the interior to see that all that is possible has been removed.
NOTE: Located on top of 93% acid tank.
G. Close 93% acid tank drain valve 100%.
H. Close coil drain inlet port manual block valve 100%.
I. Shut down coil drain pump.
NOTE: Push button on start/stop station located beneath drying tower.

OPERATOR DUTIES

A- Operator; steps, 1, 2A,2B,2C,2D, 5A, 5B, 9C, 11A, 12A, 12B, 12C, 12D, 12E, 12F, 12G, 12H, 13, 13A, 14, 14A, 14B, 15, 16F, 17A,17B, 17C, 18A, 18B, 19A, 19a, 20, 20A, 22B, 22C, 22D, 22E, 22G, 22H, 22I, 22J, 23, 23A, 24, 24A, 25B, 25C, 25D, 25E, 25F, 26, 26A, 27A,27B, 27C,27D, 28A, 28B, 28C, 28D, 29, 29A, 29B, 29C, 30E, 30Eb, 31E, 31F, 32E, 32F, 32G, 32H, 32I,

B- Operator; steps, 3A, 3B, 4A, 4B, 4C, 6A, 6B, 6C, 6D, 6E, 6F, 7A, 7B, 8A, 9A, 9B, 10, 11A, 16A, 16B, 16C,16D, 16E, 19A, 21A, 22A, 22F, 25A, 26B, 29Ba, 29Bb, 29Ca, 29Cb, 30A, 30B, 30C, 30D, 30Ec, 30Ed, 30Ee, 31A, 31B, 31C, 31D, 31G, 31H, 31I, 32A, 32B, 32C, 32D,

STARTING EAST PLANT
(POST TURNAROUND)

Shane T. Passey
12/22/99

The following is a list of items that will be needed in preparation to light sulfur burner fire.

1- 3-4 wick torches (ceramic rope wrapped around stainless tubing approx.10' in length)
2- Hand held propane cylinder w/torch attached.
3- Striker to light propane cylinder.
4- 4 gallon diesel in bucket. (soak torches in diesel)

The initial start up of the East sulfuric plant consists of two phases. Both are done at the same time and normally operator shifts are doubled up during start up allowing both phases to occur at the same time. .These phases are;

1. Heat up of sulfur burner, waste heat boilers, #1 catalyst converter, #2 catalyst converter, hot and cold pass vessels and economizer.
2. Re-stocking of #1 98% and #2 98% acid tanks and absorbing tower systems for circulation and drying air flow when blower is started during dry blows.

Re-stocking and circulation of the acid system will be discussed first as this process is continual through out the start up procedure.

FILLING #1 98% ACID TANK
(Refer to JSA # 31 for safety considerations)

1. Pre-set valves starting at tank and working toward the north plant
   A. Open 4" block valve
      NOTE: Located on top of tank north east side
   B. Close 4" block valve on line used to fill #2 98% tank.
   C. Open manual block valve above and to the north of the 93% tank (same line)
   D. Close crossover manual block valve just south of valve mention in C.
      NOTE: Valves C&D will likely be left in this position until normal plant operation resumes.

Above East plant control room of the pipe rack you will find where a series of valves and the 4" inch line meet.(Extreme west piping)

   E. Open the manual block valve where the line and the valve cluster meet.
   F. Close the south manual block valve.
   G. Open the north manual block valve.
      NOTE: This 4" line then routes itself upward to the handrail of the catwalk, then extends to the east approx. 5' and ties into a 6" line that travels north to the north plant storage system
   H. Notify North plant operator that all the valves in East plant are set for tank refill and request that he start his feed pump system .
   I. Monitor tank level
      A. Level manometer is located on control panel and marked as such.
         NOTE: Level indicator should not be totally trusted after an extended shut down.
            aa. Physically measure tank with rod hanging atop 98# tank, then compare finding with level manometer.
   J. At approx. 60-65" of acid level , call north plant and request that he shut down his acid feed to the east plant.

FILLING #2 98% ACID TANK
(Refer to JSA # 36 for safety considerations)

2. See filling #1 98% acid tank steps 1 A-J
   Exceptions: Step A and B are reversed (open manual block valve on line to #2 98% acid tank and close manual block valve dumping into #1 98% acid tank.

CIRCULATE ACID THROUGH #1 ABSORBING TOWER AND ACID COOLER SYSTEM

(Remove all locks and tags from "A" & "B" absorbing tower pump switch gear located in control room motor control center)
(Refer to JSA # 61 for safety considerations)
(Request any personal in the area to clear out)

3. Open #1 98% acid cooler automatic bypass valve 100%
   NOTE: Located on control panel and marked as such.
4. Open Drying tower acid cooler bypass valve (automatic) 100%
   NOTE: Located on control panel and marked as such
5. Close #1 98% acid cooler manual discharge valve.
   NOTE: Located at the east end of #1 cooler. (chain operated)
6. Open "A" absorbing tower pump discharge manual block valve approx. ¼ of the valve travel distance.
   NOTE: This will prevent piping and/or pump "shock" when pump is started.
   NOTE: Valve is located south side, on top of tank, middle pump.
7. Start "A" absorbing tower pump.
   NOTE: Push button located on start/stop switch beneath drying tower.
8. Open "A" absorbing tower pump discharge valve 100%.
   A. Visually inspect acid cooler and all piping associated with the "A" absorbing pump system for leaks.
9. Open "B" absorbing tower pump manual discharge block valve ¼ of the valve travel distance.
   NOTE: This will prevent piping and/or pump "shock" when pump is started.
   NOTE: Valve is located south side, on top, east pump.
10. Start "B" absorbing tower pump.
    A. Push button on start/stop station located beneath drying tower.
11. Open "B" absorbing tower pump manual discharge valve 100%.
    A. Visually inspect acid cooler and all piping associated with the "B" absorbing tower pump system for leaks.
12. Check #1 98% acid tank level manometer
    A. Check "A" & "B" absorbing tower pump amp meters
13. Retrieve an acid sample from #1 98% tank and take to lab for analysis.
    (Refer to JSA # 14 for safety considerations)
    NOTE: Ideal acid strength is 98.2%, however this figure is unrealistic at this time due to internals of absorbing towers and pump tank probably having been washed with large amounts of water during turnaround. An acid strength of above 96.0% is desired during start up.

TRANSFER ACID OUT OF #1 98% ACID TANK

(This process is necessary to rid the #1 Acid system of water saturated acid, or low strength acid and will be necessary to be repeated several times until #1 98% acid strength remains above a 96.0%)
(Refer to JSA # 22 for safety considerations)

14. See PSM #004, step 22-A-J.

REFILL #1 98% ACID TANK

(The reason for doing this is to refill the tank and #1 absorbing tower with high percentage acid)
(Refer to JSA # 31 for safety considerations)

15. Repeat filling #1 98% acid tank; step 1-A and B.
16. Notify North plant operator and request he start his acid feed pump.
17. Monitor acid tank level manometer, filling tank to approx.60-65".
18. Retrieve acid sample and take to lab for analysis.
    NOTE: This process of transfer in and out will be necessary several times to achieve desired acid strength of the #1 absorbing acid tower and pump tank system.

CIRCULATING ACID THROUGH #2 ABSORBING TOWER AND COOLER SYSTEM

(Remove all locks and tags from North and South #2 98% acid pump switch gear located in the control room motor control center)
(Refer to JSA # 36 for safety considerations)
(Request any personal in the area to clear out)

19. Open #2 acid cooler bypass automatic valve100%.
    NOTE: Located on control panel and marked as such.
20. Close #2 98% acid cooler manual discharge valve 100%.
    NOTE: Located at the east end of the #2 acid cooler. (chain operated)
21. Open North #2 98% absorbing tower acid pump discharge valve approx. ¼ of the valve travel distance.
    NOTE: This will prevent piping and/or pump "shock" when pump is started.
22. Start North #2 98% absorbing tower acid pump.
    NOTE: Push button on start/stop station located beneath drying tower.
23. Open North #2 98% adsorbing tower acid pump manual discharge valve 100%.
    A. Visually inspect acid cooler and all piping associated with the #2 98% absorbing tower acid. system for leaks.
24. Check #2 98% acid tank level manometer
    A. Check North #2 98% absorbing tower pump amp meter.
25. Retrieve an acid sample from #2 98% acid tank and take to lad for analysis
    (Refer to JSA # 14 for safety considerations)
    NOTE: Ideal acid strength in the #2 98% acid tank is 98.5%, however this figure is unrealistic at this time due to the internals of the #2 absorbing tower and acid pump tank probably having been washed with large amounts of water during turnaround. An acid strength of above 96.0% is desired during start up.

TRANSFER ACID OUT OF #2 98% ACID TANK

(This process is necessary to rid the #2 98% acid system of water saturated acid or low strength acid and will need to be repeated several times until the #2 98% acid strength remains above a 96.0%.)
(Refer to JSA # 25 for safety considerations)

26. See PSM 004, follow steps; 22-A-F.
27. Open main cooler drain manual block valve.
    NOTE: Located at ground level west of the north west stairway of cooler deck.
28. Start coil drain pump.
    A. Push button on start/stop station located beneath drying tower.
29. Open #2 98% acid cooler main drain approx. ¼.
    NOTE: Located in the center of the cooler and beneath.
30. Monitor #2 98% acid tank level manometer and flow meter.
    NOTE: Located on the control panel.
31. Lower tank until a level of approx. 12-15" is obtained

REFILL #2 98% ACID TANK

(Refer to JSA # 36 for safety considerations)

32. See filling #1 98% acid tank steps; 1 A-J
    Exceptions: Step A and B are reversed (open manual block valve on line to #2 98% acid tank and close manual block valve dumping into #1 98% acid tank.)
33. Notify the North plant operator and request he start his acid feed pump.
34. Monitor acid tank level manometer, filling tank to approx. 60-65".
35. Retrieve acid sample and take to lab for analysis.
    NOTE: This process of transfer in and out will be necessary several times to achieve desired acid strength of the #2 98% acid tower and pump tank system.

CIRCULATING ACID THROUGH DRYING TOWER

(Remove all locks and tags from drying tower acid pump switch gear located in the control room motor control center)

(Refer to JSA #23 for safety considerations)

36. Close #1 98% to 93% automatic transfer valve.
    NOTE: Located on the control panel and marked as such.
37. Open Drying tower manual discharge block valve ¼ of the valve travel distance. (pump located to the far west on top of the #1 98% acid tank)
    NOTE: This will prevent piping and/or pump "shock".
38. Start Drying tower pump.
    NOTE: Push button on start/stop station located beneath Drying tower.
39. Open Drying tower manual discharge block valve 100%.
40. Monitor #1 98% acid pump tank level.
    NOTE: Level manometer is located on the control panel.
    NOTE: It may be necessary to transfer additional acid from the North plant to the #1 98% acid tank to maintain operating level of around 32".
41. Follow, filling #1 98% acid tank steps; 1-A-I.

At this point all three towers, acid tanks and coolers should be filled and circulating as normal.

DUTIES

A-Operator-steps; 1A, 1B, 1E, 1F, 1G, 1H, 1I, 1J,2A, 3, 4, 6, 7, 8, 12, 14,15,16, 17, 19, 22, 24, 24A, 26, 27, 29, 30, 31, 32, 33, 34, 36, 38, 40, 41.

B-Operator-steps; 1C, 1D, 1Ja, 2C, 2D, 5, 9, 10, 10A, 11, 13, 14, 18, 20, 21, 23, 23A, 25, 26, 28, 28A, 32, 35, 37, 39.

STARTING UP EAST PLANT
(HEATING SULFUR BURNER)
(DRY BLOW PROCEDURE)
(POST TURNAROUND)

The following is a list of items that will be needed in preparation to light sulfur burner fire.

1- 3-4 wick torches (ceramic rope wrapped around stainless steel tubing approx. 10' in length)
2- Hand held propane cylinder w/torch attached.
3- Striker to light propane cylinder.
4- 4 gallon diesel in bucket. (soak torches in diesel)

1. Preset BV dampers as follows:
   A. BV#1- Open 100% to start.
   B. BV#2- Close 100%.
   C. BV#3- Close 100%.
   D. BV#3A- Close 100%.

2. Remove start up stack cover.
   (Refer to JSA # 11 for safety considerations)
   NOTE: Located on the #1 waste heat boiler discharge duct and on top of same duct.

3. Start Main Blower
   (Refer to JSA # 71 for safety considerations)
   A. Start lube oil system
      NOTE: Turn switch to manual on start/stop station south of governor control. And check oil. Press.
   B. Open high pressure inlet manual block valve slowly (chain operated) until blower shaft begins to turn.
   C. Check blower tachometer for speed.
      NOTE: A discharge press. Of about 2" is necessary to supply burner internals with adequate air to fuel ratio in order to get the gas gun to light.
      Note: The approx blower speed to obtain 2" is about 400-600 rpm and is regulated by the high press. Inlet chain valve south of main blower.
   D. Close back on the #1 BV damper slowly until a "woofing" sound can be heard. This indicated that damper is nearly closed and needs to be opened slightly more.
      NOTE: This will slow down the air flow to burner internals and allow the fire torch to be inserted without blowing it out.
   E. Light the diesel soaked torch and insert into access port on the center of the sulfur burner.
      NOTE: Hold torch near the end of the natural gas gun.
   F. Reset burner gas control interlock system
      NOTE: Control panel located west end of sulfur burner on wall. Push reset button.
   G. Open manual gas inlet valve slightly.
      NOTE: Located on burner deck where gas line comes from beneath grating.
   H. Open automatic "Maxi" valve.
      NOTE: Located north end of burner deck.

At this point "FIRE ON" Indication lamp should be on (control box on west wall). Historically it takes several try's to get burner lit. If gas gun fire goes out repeat steps; 3 D-F, and possible readjustment of the #1 BV damper will be necessary to obtain proper air to fuel ratio.

4. Begin with an internal temperature of 500 degrees.

A. Adjust temp internally by opening or closing as needed the manual gas supply valve located at burner deck . Note press. Guage reading
B. Hold this temperature for 4 hours.

5. Increase burner temp 100 degrees per hour until 900 degrees is obtained
   A. Hold this temperature for 4 hours.
   NOTE: Increase temperature by opening manual gas supply valve on burner deck. Note press.

6. Increase burner temperature 100 degrees per hour until 1200 degrees is obtained.
   A. Hold this temperature for 4 hours.
   NOTE: Manual gas supply valve on burner deck.

7. Increase burner temperature 100 degrees an hour until 1600 degrees or high is obtained.
   A. Hold this temperature for 4 hours.
   B. Increase burner temperature to 1850 degrees and hold 2 hours in preparation for dry blow
   NOTE: Manual gas valve on burner deck.

8. Close #1 waste heat boiler vent valve when drum press reaches 30psi.
   (Refer to JSA # 4 for safety considerations)
   NOTE: Valve is located on the top of the #1 waste heat boiler and will be easily identified by the steam blowing from it.
9. Main bulk head and non-return valves on top of #1 waste heat boiler will need to be opened at 150psi.
   (Refer to JSA # 4 for safety considerations)
10. Watch #1 waste heat boiler water level, will be necessary to add water as the boiler heats up and begins to make steam.
    A. turn on boiler feed pump (remove all locks and tags from switch gear located in control room motor control center.)
    Note: Start/stop switch is located east side of either boiler feed pump. (switch to manual mode) Pump will start.
    B. Add some water to boiler if needed.
    NOTE: Level control located on control panel and marked as such.
11. Circulate acid through the drying tower.
    (Refer to JSA # 7 for safety considerations)
    NOTE: THIS IS ESSENTIAL TO REMOVE MOISTURE FROM THE AMBIENT AIR STREAM AS MOISTURE WILL DAMAGE CATALYST BEDS. NATURAL GAS HAS A CERTAIN AMOUNT OF MOISTURE CONTENT AS IT IS AND THE ADDITIONAL MOISTURE COULD POSSIBLE DAMAGE THE CATALYST BEDS FURTHER. (NOTHING CAN BE DONE TO REMOVE THE MOISTURE FROM THE NATURAL GAS)
    NOTE: MAKE SURE MAINTENANCE HAS REMOVED BLANK IN START UP DUCT LOCATED ON INLET DUCT TO #1 CATALYST CONVERTER (TOP OF CONVERTER VESSEL)

12. Preset BV dampers #4-7 for maximum heat up during dry blows.
    A. BV#4- Closed 100%
    B. BV#5- Open 100%
    C. BV#6- Closed 100%
    D. BV#7- Closed 100%
13. Shut off fire in burner.
    A. Close manual gas supply valve.
    NOTE: Located at floor level on burner deck. "FIRE ON" Lamp will go out.
14. Shut down main blower.

(Refer to JSA # 71 for safety considerations)
A. Close high pressure inlet chain valve.

15. Install start up stack cover
(Refer to JSA # 11 for safety considerations)
A. Clamp cover to flange to hold in place.
16. Open BV damper #1 100%.
A. Located at west end of burner and chain operated.
17. Open BV damper #2 100%.
A. Located at the east end of sulfur burner and chain operated (south chain)
18. Open BV damper # 3A 100%.
A. Located in the discharge duct of # 1 waste heat boiler and is chain operated (middle chain)
NOTE: BV.# 3 will be left closed during burner heat up and dry blows.
19. Start Main blower.
(Refer to JSA # 71 for safety considerations)
A. Steps; 3 B and C.
B. Open high press. Inlet steam valve until approx. 1200-1500 rpm is obtained
NOTE: monitor tachometer for speed.
20. Monitor sulfur burner temperature indication
NOTE: Located on control panel and marked as such.
21. Continue the dry blow until burner temperature decreases to approx. 1050 degrees
22. Shut down main Blower.
(Refer to JSA # 71 for safety considerations)
A. Close high press. Inlet manual chain valve.
23. Remove start up stack cover plate.
(Refer to JSA # 11 for safety considerations)
24. Close BV#3A 100%
25. Close BV#2 100%
26. Start main blower.
(Refer to JSA # 71 for safety considerations)
A. See steps; 3 B and C
27. Close BV# 1 nearly 100%
A. See steps; 3 D and attached note.
28. Re- light Burner internal fire.
A. See steps; 3 F,G and H
B. Burner should light off directly without the aide of the wick torch at this point however, the torch may be needed to get fire re-lit. In that case see step; 3 E, F, G AND H.
29. Open manual gas supply valve all the way open to achieve maximum burner heat up (1850-1900 degrees)
A. Monitor burner temperature indication.
NOTE: Located on control panel.
30. Start dry blow #2
A. Repeat steps; 12, 13, 14, 15, 16, 17, 18A and B, 19, 20
31. Re-heat burner.
A. Repeat steps; 21, 22, 23, 24, 25, 26, 27, 28.

The process of heating burner, blowing heat through will need to be done several times until the out let temperatures of all catalyst beds reach a temperature of over 400 degrees. (particularly 3a and 3b)
NOTE: Monitor bed temperatures on 32 point trendicator located on control panel.

WET BLOW
(Process of blowing continual heat through out the burner, boilers, #1 catalyst converter,#2 catalyst converter and exiting economizer, via the installed natural gas fired gun)

32. Shut down main blower.
(Refer to JSA # 71 for safety considerations)
    A. Close high press steam inlet chain operated valve.
    NOTE: Located south side of main blower.
33. Install start up stack cover plate. (permanently bolt in place)
    (Refer to JSA # 11 for safety considerations)
34. Open BV# 1 damper as needed as before mentioned to put fire on gas gun.
34. Open BV# 2 100%.
35. BV# 3 remains 100% closed.
36. Open BV# 3A 100%.
37. BV#4 remains closed 100%.
38. Open BV#5 100%.
39. BV#6 remains closed 100%.
40. BV# 7 remains closed 100%.
41. Start Main blower.
    A. See steps; 3 B and C
42. Put fire on gas gun.
    A. See steps; 3 F, G, H
    B. Open manual gas valve 100%

NOTE: Blower rpm speed will have to be determined by recommended burner temperature and available gas press supplied to gas gun. Typically 1800 degrees.

44. "Line the plant out" using the BV dampers #1-5 to bring the #1 and #2 converter catalyst beds into range as prescribed or conversion temperature of 780 degrees outlet.
    NOTE: Inlet and outlet bed temperature recommendations are as follows:
    (note: these recommendations are based on current, normal operating conditions as of 12/20/99)

	INLET	OUTLET
#1-	804*	1112* (not to exceed 1125* as catalyst grids begin to crystalize at this temperature)
#2-	801*	981*
#3A-	850*	897*
#3B-	833*	890*
ECONOMIZER-	890*	456*
#4-	800*	838*

DUTIES

A Operator, steps;1A, 1B, 1C, 1D, 3A, 3B, 3C, 3D, 3F. 3G, 4A, 4B, 5, 5A, 6, 6A, 7,7A, 7B, 10, 10A, 10B, 11, 12A, 12B, 12C, 12D, 13A, 14A, 18A, 19A,19B, 20, 21, 24, 25, 26A, 27A, 28A, 28B, 29, 29A, 30A,31A, 32A, 34, 35, 36, 37, 38, 39, 40, 41, 42A, 43A, 43B, 44
B Operator, steps; 2, 3B, 3C, 3E, 3H, 8, 9, 11, 15A, 16A, 17A, 19A,19B, 22A, 23, 26A, 27A, 30A, 31A,33, 42A, 43A

EAST SULFURIC PLANT TO NORMAL PRODUCTION
(BURNING SULFUR)
(POST TURNAROUND)

Shane T. Passey
12/28/99

After prescribed wet blow of plant internals have been completed and prescribed catalyst bed temps have been met.

1. Close natural gas main block valve to gas gun. (this will kill the fire in the burner)
   NOTE: Located at west end of burner floor level.
2. Shut down main blower.
   (Refer to JSA # 71 for safety considerations)
   A. Close high press. steam inlet valve
      NOTE: Located south of main blower and is chain operated.
3. Request maintenance remove gas gun.
4. Request maintenance install sulfur guns (3) nozzle size 60.
5. Remove economizer blank.
   (Refer to JSA # 11 for safety considerations)
   NOTE: Located west end of economizer and atop platform
   May be necessary to use come-a-longs to assist in removal
6. Install economizer bottom door.
   (Refer to JSA # 11 for safety considerations)
   NOTE: Located east side at ground level. Picker or forklift will be needed.
7. Request maintenance install 4th bed start up duct blank.
   NOTE: Located on top of #1 catalyst converter.
8. Check entire sulfur system from pumps to burner to insure that all steam jacketed piping is hot and ready. (i.e. will melt sulfur when touched to piping)
   (Refer to JSA # 62 for safety considerations)
9. Preset BV dampers for maximum heat up of #1 and #2 catalyst beds.
   A. BV#1- open 100%
   B. BV#2- open 100%
   C. BV#3- closed 100%
   D. BV#3A-100% open and will remain this way during normal year long operation.
   E. BV#4- closed 100%
   F. BV#5- open 100%
10. Set all three (3) sulfur guns to approx. 1/3 open.
    (Refer to JSA # 62 for safety considerations)
11. Set automatic sulfur controller to about 5% open or less.
    NOTE: Located on control panel and marked as such.
12. Close 2000hp. Booster blower louvers 100%.
    NOTE: located on control panel and marked as such.
    NOTE: observe motor interlock system for green "GO" light
    Located in booster blower building on east wall control panel.
12. Circulate cooling water through all three acid coolers.
    (Refer to JSA # 66 for safety considerations)
    A. Open "A" cooling pump discharge block valve to 25%. This will reduce the possibility of piping and/or pump shock when pump is started, chain operated.
    B. Open "B" cooling pump discharge block valve to 25%. This will reduce the possiblity of piping and/or pump shock when pump is started, chain operated.
    C. Start both "A" and "B" cooling pumps.
       NOTE: Push buttons located on start/stop stations located south of pump deck at ground level.
    D. Open manual discharge chain operated block valves to 100%.
       NOTE: Located east of each pump.

13. Notify North plant, Phos acid, and DAP that you are going to start the East plant up and will be burning sulfur.
14. Start 2000 hp. Booster blower.
    (Refer to JSA # 59 for safety considerations)
    A. Push button on control panel located on east wall of booster blower building marked, "RUN", and hold for 10-15 seconds.
    B. Wait for booster blower to achieve maximum speed
    C. Push vibration trip buttons.(2)
    NOTE: Located on east side of booster blower motor housing about knee level. one to the north end of east side and one to the south end of east side.
15. Monitor 2000 hp. Booster blower amp meter. (will be pegged to maximum reading until full speed is obtained)
    NOTE: Located on control panel and marked as such
16. Open booster blower louvers to approx. 25% open to start. (after amp meter stabilizes)
17. Start the sulfur pump.
    NOTE: Push button on control panel marked as such.
18. Adjust sulfur flow to approx.10-12 gallon per min.
    A. Monitor SO2 monitor (3.6 ppm max. per hour)
    B. Allow burner to heat up to 1600* (approx.)
19. Start the Main blower and adjust speed to approx. 2000 rpm.
(Refer to JSA # 71 for safety considerations)
    NOTE: This will most likely be achieved by opening the high press. steam inlet chain operated valve 100%.
20. As the sulfur burner temp begins to drop, increase the sulfur flow to approx. 16-20 gpm
    NOTE: Using auto sulfur controller located on control; panel and marked as such.
21. Hold burner temp at as near 1600* as possible.
    NOTE: Monitor sulfur burner temp indication on control panel.
22. Level off 1ST bed inlet temp at about 800-810 degrees
    A. Open BV#3 as needed.
    NOTE: chain operated damper located west of #1 waste heat boiler, North chain
    NOTE: Do not attempt to cool 1st bed inlet by closing BV#2 until BV#3 is wide open as this will cause a restriction in the system air flow, causing possible stress to internals, as well as creating a rich fuel to air ratio due to decreased oxygen flow.
23. After BV#3 has been opened 100%.(boiler outlet damper), begin closing BV#2 (boiler bypass damper) as needed to maintain 1st bed inlet temp.
24. Level off 2nd bed inlet temp at about 800* or aiming for an outlet temp of about 975-980* by opening BV#4 (#2 boiler outlet damper).
    NOTE: See step 22 as well as notations and cautions.
25. Level off 3rd bed inlet temp at about 850* and 895* outlet
    A. This can be done by switching BV#6 automatic damper controller to manual and opening or closing damper as needed. However, the best course of action to heat these beds are to maintain prescribed temps, inlet and out, of the 4th bed and allow beds 3A and 3B to fall into line on their own.
    NOTE: Caution as well as experience in using this damper to heat or cool beds 3A and 3B is helpful, as this damper will also heat or cool 4th bed inlet temp. Opening or closing this damper to far one way or the other will be detrimental in obtaining prescribed operating temps. A "Happy medium" will need to found between proper operating temps of these three beds in relation to the operation of BV# 6.
26. Level off 4th bed inlet temp at approx. 800-810* or whatever it takes to achieve an outlet temp of above 780* (conversion temp) Outlet temp at 838-840*.(normal operating temp)
27. BV# 7 typically is left closed during operation.
    NOTE: This damper is another source of heating or cooling beds 3A, 3B and 4th bed. But temp recommendations are currently achieved by using BV# 6 and leaving BV# 7 closed.

At this point the plant should be heating up nicely according to present rate. However the plant should be physically looked at, i.e., Converter man way covers, duct work, vessel exteriors, piping, boiler hand hole covers, etc., for any gas leaks, water leaks, acid leaks etc.

28. Monitor acid temps in #1 & #2 absorbing towers (180* normal run temp)
    NOTE: Located on control panel 32 point trendicator selector.
    NOTE: The acid system will already have been in circulation as before mentioned during heat up.
    NOTE: Manual chain operated cooler discharge block valves have been closed 100% as previously mentioned.
    NOTE: #1 98% and #2 98% acid cooler automatic bypass valves have been opened to 100% as previously mentioned to bypass acid around coolers and hold the acid temp up best as possible.
    NOTE: As the acid temps in coolers heat up in will be necessary to open manual chain operated block valves sending acid through coolers to cool.
(Refer to JSA # 22 for safety considerations)
    NOTE: DO NOT CLOSE AUTOMATIC BYPASS VALVES UNTIL COOLER DISCHARGE CHAIN VALVES HAVE BEEN OPENED 100%. AS THIS WILL CAUSE POSSIBLE COOLER AND PIPING RUPTURE.
29. Start at least one cooling tower fan, at approx. 170 degrees acid temp (#198% and #298%)
    (Refer to JSA # 6 for safety considerations)
    A. Switch speed button to "low".
        NOTE: Located on speed selector station on top of cooler tower deck, located east side of either fan nozzle.
    B. Switch direction switch to "forward".
        NOTE: Located on directional selector station atop of cooling tower deck, located east side of either fan nozzle. A wait time of approx. 2 min before fan begins to turn.
30. If more cooling is needed, switch fan to high.
    (Refer to JSA # 6 for safety considerations)
    A. Turn speed selector switch to "HIGH"
        NOTE: Located on speed selector switch on top of cooling tower deck, east side of fan nozzle.
31. When further cooling is needed. Start the other fan.
    (Refer to JSA # ^ for safety considerations)
    A. See steps 29 A & B and 30 A.
32. Hold plant at this rate until all 5 converter beds are within the recommended heat ranges, both absorbing towers acid temps are at least 170*or higher (180* being max.) and the SO2 monitor has dropped to its lowest point and begins to level off.
33. Continue acid samples to the lad for analysis every 2 hours.
    (Refer to JSA #14 for safety considerations)
    Note: Adjust acid dilution water as needed to maintain acid strengths as recommended.
        A. #1 98%- 98.2%
        B. #2 98%- 98.5%

Note; For every sulfur increase during rate change it will be necessary to increase water dilution flows. Good rule of thumb is to add on gallon of water through the #1 98% dilution system for every gallon of sulfur burned. #2 98% dilution will have to be felt out according to lab analysis as well as 93% system.

With all converter beds, acid temps and SO2 monitor meeting prescribed requirements. It is then time to "Step" the plant up to the next rate level.

34. Notify North plant Phos acid, and DAP that you are going to increase the east plant to rate level.
35. Increase main blower speed to approx. 2600 rpm.
    (Refer to JSA # 71 for safety considerations)
    A. Rotate main blower governor controller clock wise until speed is achieved.
        NOTE: Governor located on blower deck, east end of blower.

B. Monitor blower speed tachometer.
NOTE: Located east of blower governor controller.

36. Increase sulfur flow to approx. 25 gpm
A. Rotate sulfur controller clockwise.
NOTE: Located on control panel and marked as such.

37. Monitor #1 and #2 converter bed temps.
NOTE: Adjust accordingly to maintain previously mentioned recommendations.
A. Begin opening BV#3 to cool 1st bed until damper is 100% open.
B. Begin to close BV#2 to cool 1st bed further until temp recommendation is met.
C. Begin to open BV#4 to cool 2nd bed until damper is 100% open.
D. Begin to close BV#5 to cool 2nd bed further until temp recommendation is met.

38. Monitor 4th temp
NOTE: Adjust accordingly to maintain previously mentioned temp requirement.
A. Close BV#6 to heat or open to cool.
NOTE: Located on control panel and marked as such.

39. Hold current rate until all 5 beds have been adjusted and maintained according to recommendations.

40. Increase main blower speed to approx. 3200 rpm.
(Refer to JSA # 71 for safety considerations)
NOTE: See steps 34-38
Exception: Step 36. Increase sulfur flow to approx. 30 gpm.

41. Hold current rate until all 5 beds have been adjusted and maintained according to recommendations.

42. Increase main blower speed to 3800 rpm.
(Refer to JSA # 71 for safety consideration)
NOTE: See steps 34-38
Exception: Step 36. Increase sulfur flow to approx. 35 gpm.

43. Hold current rate until all 5 beds have been adjusted and maintained according to recommendations.

44. Increase main blower speed to 4200 rpm (Maximum rate)
(Refer to JSA # 71 for safety considerations)
NOTE: See steps 34-38
Exception: Step 36, Increase sulfur flow to approx. 40 gpm

45. Hold current rate until all 5 beds have been adjusted and maintained according to recommendations

46. Monitor SO2 monitor for recommended emission control (3.6 ppm per hour)
NOTE: Chart located east end of control panel and marked as such.

47. Monitor sulfur burner temp. 1900* max.
NOTE: At this point burner temp will typically be around 1800-1825*

48. Hold the above mentioned burner temp and sulfur flow until internals have a chance to "warm up" and level off.

49. Increase sulfur flow as needed
A. Rotate sulfur flow controller clockwise at about 2/10-3/10 of a gallon and let burner temp level off
B. Adjust bed temps further as needed
NOTE: #1 bed by opening or closing BV#2 as needed.
NOTE: #2 bed by opening or closing BV#5 as needed.
NOTE: #4 bed by opening or closing BV#6 as needed.

50. Continue this "inching up of rate" until Max. Sulfur flow is achieved according to ambient temps (44 gpm)

51. Monitor acid tank levels. At approx. 55-60 % on acid tank level control indicator

52. Start 93% product transfer system.
(Refer to JSA # 8 for safety considerations)
A. Open 93% automatic transfer valve approx. 25%.
B. Open manual 98%-93% block valve 100%.
Note: located on south side of drying tower.
C. Open manual recycle valve approx. 1 ½ turns.
Note: located on top of 93% acid tank east of pump.
D. Open 93% acid transfer pump manual block valve 100%.

E. Start Pump
Note: Push button located on start/stop station beneath drying tower.

F. Open 98%-93% automatic valve approx. 50%.
NOTE: Located on control panel and marked as such.
Note; This will dump 98% acid from #1 98% system to 93% system for dilution and transfer top storage.

53. Switch #2 98% acid controller to auto.
NOTE: Located on control panel and marked as such.
Note; This will allow #2 98% acid to transfer from #2 98% acid system to #1 98% acid system.

54. Switch 93% acid controller to auto when tank level fills to above controller set point.
NOTE: Automatic valve will slam shut if valve is switch to automatic before tank level is above set point.

During plant rate increases it is necessary to continuously monitor all press. guages, boiler levels, acid temps, converter bed temps, acid transfer flows and etc. to ensure proper operation of the East Sulfuric Acid Plant.

DUTIES

A Operator- steps; 1, 3, 4, 5, 6, 7, 9A-F, 11, 12, 13, 15, 16, 17, 18A-B, 20, 21, 22A, 23, 24, 25A, 26, 27, 28, 34, 36A, 37A-D, 38A, 39, 41, 43, 45, 46, 47, 48, 49A-B, 50, 51, 52A, 53, 54
B Operator- steps; 2A, 5, 6, 8, 10, 12A-D, 14A-C, 19, 29A-B, 30A, 31A, 33, 35A-B, 40, 42, 44, 52B-F,

DEPRESSURIZE AND DRAIN WASTE HEAT BOILERS AND ECONOMIZER

Shane T. Passey
12/29/99

(PLANT DOWN)
(INTERNALS COOL)

Refer to JSA # 28 for safety considerations
Refer to steps; 1-5 for procedure

DUTIES

A Operator- 1, 4, 5,
B Operator- 2, 3,

Area 3 - DAP Plant

Excess emissions may be experienced during startup of the DAP plant. Proper mole ratios in the granulator feed slurry for optimum operation cannot be reached until the plant is operating. Adjustments are made to reach the proper mole ratios as quickly as possible. When the proper mole ratios are reached, the emissions are managed by plant control equipment.

The above procedure results in emissions which may exceed visible emissions limitations specified in IDAPA 16.01.01.625 (ie; 20% opacity by VE). Excess emissions of other pollutants from DAP operations listed on sheet "ER-11" in section 3 of this application may also be likely. Total startups of the DAP plant are reported to the Department on a monthly basis.

The information required at IDAPA 16.01.01.314.03 is as follows:

(03.a) The equipment identified as the DAP Plant can be cross-referenced as S-Fa-1, 2, & 3 in this application.
(03.b) The specific pollutants likely to be emitted in excess of applicable standards are PM and Fluorides.
(03.c) The estimated amount of excess emissions expected to be released during each event would be extremely difficult to quantify, but the term 'excess' implies greater than the emission limit. (03.d) The expected duration of each excess emissions event would depend on the individual circumstances of each event.
(03.e) Efforts to minimize the amount and duration of each excess emissions event will be maintained. Excess emissions may be unavoidable for any of the three types of excess emissions events: startup, shutdown, and scheduled maintenance, because the pollution control devices associated with this equipment are essential to its operation.
(03.f) The frequency at which the three types of excess emissions events are expected to occur cannot be specified.
(03.g.i) Scheduled maintenance is needed when the operating equipment is not functioning properly, or when pollution control equipment is not functioning properly.
(03.g.ii) Scheduled maintenance is usually performed during periods when operation of the emissions unit or other sources has been reduced or ceased. Maintenance to the equipment usually cannot be affected without reducing or ceasing operation.
(03.g.iii) Maintenance is scheduled to minimize downtime, minimize excess emissions; to optimize performance of the equipment and control devices, and maximize on-stream time. Good engineering practices are followed when performing scheduled maintenance.
(03.g.iv) Where applicable, it may be necessary to by-pass, take off line, or operate pollution control equipment at reduced efficiency while maintenance is being performed in order to prevent greater excess emissions from occurring if the entire process were shut down.
(03.g.v) Auxiliary air pollution control equipment is not applicable to this equipment.
(03.h) Good engineering practices are followed relative to this equipment. Modifications and redesign are pursued when they are efficacious.
(03.i) Detailed specification of the procedures to be followed by the owner or operator which will minimize excess emissions at all times during startup, shutdown, and scheduled maintenance follow this section.

DRY PRODUCTS AMMONIA PROCESS SAFETY

NOTE: Wear all protective equipment when opening and closing ammonia valves.

INITIAL START UP OF AMMONIA SYSTEM

1.) Open center manual valve - West - handle liquid ammonia to pump suction.

2.) Turn both safety electrical air operated shut off valve switches to open position (Clockwise).

A.) #1 switch is in southeast corner of ammonia loading/unloading area on control panel.

B.) #2 switch is on granulation's control panel in control room.

3.) Close manual bleed off valves on suction and discharge sides of liquid ammonia pumps.

4.) Open manual suction valves on liquid ammonia pumps (north and south).

5.) Open manual discharge valves on liquid ammonia pumps (north and south).

6.) Open manual inlet and outlet valves on ammonia pressure control valve (liquid recirculation line).

7.) BFL vaporizer

A.) Close bleed off line between block valves to vaporizer..

B.) Set liquid level controller on pressure control 60-80-psi.

8.) BFL VAPORIZER

A.) Close bleed offs.

a.) Between ammonia to granulator manual block valves.
b.) On down leg of ammonia by slurry sample valve.
c.) Between ammonia block valves to pren-tk.
d.) BFL vaporizer drain valve.

C.) Set ammonia vapor controller to preneut @ 20% manual.

D.) Set ammonia vapor pressure off BFL vaporizer 60-80 lbs

E.) Open manual ammonia block valve to vaporizer.

NOTE* Ammonia temperature from super heater ranges from 150 degrees to 330 degrees F. depending on flow rate and steam flows to super heaters,normally little superheater

manual valve will be open a couple turns. large superheater temperature controlled with auto controller on board.

E.) Open all ammonia spargers to preneut tank (except on 18-46-0 and 16-20-0. Close the west sparger until tank is charged). All valves for spargers are on top of the preneut tank.

F.) Open inlet manual 35 lb startup steam valve and open manual controller to 50% area to heat up vaporizer so it will vaporize ammonia .temperature of BFL is near or above 80 degrees f. open manual block valve to vaporizer& manual block valve to pren-tk then set flow controller to prenuet tank on manual at 20% to get ammonia flow established from vaporizer.

G.) Start ammonia feed pump to feed ammonia to BFL vaporizer.

NOTE* Vaporizer is a shell and tube heat exchanger. Ammonia is on the shell side hot gasses flow through tubes to vaporize ammonia. This creates condensate that is collected in level controlled tank at bottom of vaporizer .This condensate is pumped to top of vaporizer where it is spayed into hot gas stream at 300 gpm flow rate through tubes to help heat transfer and to help keep tubes clean..excess condensate flows into flourine tank that returns to cooling pond.

H.) Open 125# manual steam valves to super heaters ,wide open to large super heater.only couple turns open to small super heater.Control super heater temperature with auto controller on control board for big superheater. .

NOTE* Super Heaters - Ammonia flows on shell side around tubes that are heated by 125 lb. steam to heat vapor ammonia to desired temperature normally between 180-210 degrees f.

I) Open inlet manual valves on ammonia to granulator or ammonia to the preneut tank depending on where the flow is needed to go.

J.) Vapor ammonia will start to flow to preneut tank or granulator (depending on which one was opened) when flow is established start ammonia feed pump from control board.

NOTE* Ammonia pumps will pull between 8 and 12 amps when primed.

9.) Set line pressure with controller (on north wall) to supply plant with 105 to 150 lbs. of pressure.

NOTE* The pumps are designed to put out 100 lbs. more pressure than inlet pressure and are protected by an internal relief valve to allow ammonia to recirculate within the pumps, if the ammonia pressure exceeds 100 lbs. Manual setting of this valve is three (3) turns

open.

10.) When preneut tank is charged and dry system is heated and rolling.

A.) Open ammonia block valve to granulator. And set controller on maual at desired flow rate.

B.) If above procedures are followed, the plant will be in the normal operating condition.

11.) To shut plant down, reverse procedure (step 10-1).

OPERATOR DUTIES

A-operator; steps, 2B, 7B, 8C, 8D, 8J, 8K, 10A, and 10B.
B-operator; steps, 7A, 7C, 8A, 8B, 8E, 8F, 8G, 8H, and 8I.
C-operator; steps, 1, 2A, 3, 4, 5, 6, and 9.

RUPTURED AMMONIA LINE

1.) If the line is leaking inside the granulation plant, and using your PPE you cannot shut it off:

A.) Close safety electrical air operated shut off valve under sphere by turning switch on control panel and shut running equipment down by control panel.

B.) Shut ammonia pump off.

C.) Evacuate everyone from granulation plant until it is safe to return.

D.) When you can return to granulation plant go to step 2C below.

2.) If ammonia line is leaking inside the granulation plant, and using your PPE you can close a valve to stop the leak.

A.) Close the appropriate valve to stop the leak.

B.) Shut the appropriate equipment down that is affected by the leak.

C.) Shut ammonia feed pump down.

D.) Block ammonia to vaporizer (manual block valves)

E.) Block 35 lb. and 125 lb. steam if necessary.

F.) Shut down any other parts of the system that is still running and affected.

3.) After the ammonia line has been fixed and checked for leaks follow start up procedures for start up.

START UP FOLLOWING TURN-AROUND

1.) Follow the same steps as the initial start up procedures and make sure you check any line or equipment that was worked on during turn-around.

START UP FOLLOWING AN EMERGENCY SHUT-DOWN

Power Failure

1.) Check plant out thoroughly to look for problems.

2.) Start Dryer fan.

A.) Make sure louvers are closed.

B.) Turn water on dryer duct after fan is running.

3.) Start granulation fan.

4.) Start scrubber system.

A.) Call phos to start 42% incoming pump.

B.) Start reactor feed pump to recirculate scrubber acid.

C.) Start pond water.

5.) Start dry side up.

A.) If granulator has to be jackhammered or cleaned, do this before starting dry side.

B.) Start dust fan.

6.) Start Fire.

A.) Turn on gas and draft to #1 and #3 burners.

B.) Adjust amount of fire needed on control panel in granulation control room to heat dry side to desired temperature.

7.) Start reactor feed acid to preneut tank.

8.) Start ammonia system.

A.) Set ammonia vapor controller to preneut tank and to granulator to desired positions.

B.) Set ammonia BFL vapor pressure controller to desired pressure (60-80 psi.

C.) Open 35 lb steam outlet manual valve if required to heat BFL to vaporize ammonia.

D.) Open 125 lb steam outlet manual valve.

E.) Open liquid ammonia manual valve on inlet of the BFL vaporizer.

F.) Open outlet manual valve on ammonia and reactor feed acid block valve (closing recirculation valve) or ammonia outlet valve and slurry valve (closing slurry recirculation valve) to granulator, depending on where the flow is needed.

G.) Start ammonia pump from the control panel in the granulation control room. Vapor pressure will start to flow (to granulator or preneut tank depending on which valve is open) as soon as the level and pressure builds in the vaporizer.

NOTE* If preneut tank is too full for flows, you may have to put slurry and ammonia flows to granulator first to make room for the acid and ammonia flows in the preneut tank. Which would mean doing steps 1, 2, 3, 4, 4B, 4C, 5, 6, and 8A,B,C,D,E,Fb,G. Then do steps 4A, and 8Fa. .

H.) Turn natural gas and drafts on #1 and #3 burners.

I.) Start slurry pump and recirculate back to preneut tank.

J.) Start dry system.

K.) Turn steam on granulator sprays.

L.) Start pond water valve by supply pump.

NOTE* Supply pump is west pump by stairway to fluorine tank top.

M.) Turn steam off granulator sprays.

N.) Put slurry flows into the granulator.

9.) After granulation load builds.

A.) Start cooler.

B.) Start cooler fan.

C.) Open jeffery feeder which puts product into cooler.

D.) Start Arrmaz dust treatment when cooler has sufficient load.

RUPTURED AMMONIA LINE

1.) After the ammonia leak has been fixed and checked for leaks, follow the start up procedure for start up after a power failure.

OPERATORS DUTIES

A-operator: Steps. 1, 2A, 3, 4A, 4B, 5, 7, 8A, 8B, 8F, 8G, 8N, 8M, 8K, 8J, 9A, 9B, 9C.
B-operator: Steps. 1, 2B, 6, 8C, 8D, 8E, 8H.
C-operator: Steps. 1, 2, 4C, 8L, 8I, 9D.

NORMAL OPERATIONS

1.) To control pressure in the BFL increase or decrease the valve set point 60-80 psi.

2.) Control normal mole ratio of .60 -.80 in scrubber acid tank by the amount of:

A.) Incoming 42% acid.

a.) To adjust, increase or decrease the controller set point to desired gpm of acid.

B.) Excess amount of ammonia added to granulator.

a.) To adjust, increase or decrease the controller setpoint (to desired flow)

C.) Excess amount of ammonia added to preneut tank.

a.) To adjust, increase or decrease the controller setpoint to desired flow

4.) To control the level in scrubber acid tank open incoming 42% acid valve to pump tank and have Phos start the pump. Open reactor feed suction valve to preneut tank. (Discharge valve is on

granulator deck behind control room). Open discharge valve and start pump.

5.) Control preneut tank at desired mole ration by the amount of:

A.) Reactor feed acid being pumped from scrubber tank by increasing or decreasing the setpoint on the reactor feed controller.

B.) Increase the amount of ammonia to preneut tank by increasing or decreasing the setpoint on the moore controller.

6.) To control slurry to granulator, increase or decrease the flow by adjusting slurry to granulator controller.(VFD) pump speed control.

7.) Control the amount of ammonia to the granulator. Adjust (moore) controller to increase or decrease the amount of ammonia to the granulator so bed becomes dry. (Excess ammonia flow will raise mole ratio in scrubber acid tank which in turn will raise mole ratio in preneut which in turn will raise granulator mole ratio etc, etc, etc.).

NORMAL START-UP

1.) Follow same steps as the power failure start up procedure except when coming to step 4 the scrubber pump tank will have to be partially filled with 42% incoming acid before starting the procedures. Start with 4A, then 4B, and then proceed with start up procedure 2-9D.

OPERATORS DUTIES

Same as for power failure start up.

NORMAL SHUT DOWN

1.) To shut plant down reverse normal start up procedures 9D to 2.

EMERGENCY SHUT DOWN

Power Failure

1.) Leave block valves open to BFL vaporizer..

2.) Close the 35# and 125# steam a manual block valves.

3.) Close Ammonia Vapor to Granulator.

4.) Close Ammonia Vapor to the Preneut tank.

5.) Close sulfuric valve for grade control.
6.) Shut fire and natural gas off.

7.) Take slurry pump out of service and steam out slurry pump while there is still steam.

8.) Block slurry to granulator block valve closest to head end of granulator (West valve)

9.) Open slurry and recirculation to preneut valve (furthest to the East)

10.) Turn steam on granulator sprays to steam out slurry and then shut off.

11) Shut pond water valve by supply pump (west pump by stairway to fluorine tank top.

OPERATORS DUTIES

A-operator; steps, 3, 4, 5, 7, 8, 9.
B-operator; steps, 1, 2, 12.
C-operator; steps, 6, 10, 11.

EMERGENCY SHUTDOWN

Ruptured line

1.) Use same steps as emergency shutdown during a power failure, unless valves cannot be closed because of leak, then proceed as follows.

A.) Close safety shut off switch to sphere that is on granulation plant control panel to shut ammonia flow off.

B.) Evacuate all personnel and do not return until safe.

These appear to be "normal operating Limits ... (not start-up/shutdown/mx) therefore consider writing more limits as needed to prevent emiss limit exceedances.

OPERATING LIMITS

1.) Consequences of deviation.

A.) If ammoniation of preneut tank is too fast it will cause more fumes than the scrubber system can pull away and will cause fumes to vent out from any cracks, holes, or unsealed duct work, (which under normal conditions would not leak), and fill the plant with ammonia fumes. This will cause a hazardous environment.

B.) If ammoniation of granulator is too fast it will cause more fumes than the scrubber system can pull away and will cause fumes to vent out from the doors on the granulator tail end, head end, retainer ring, and out cracks and unsealed duct work, (which under normal conditions would not leak), and fill plant with ammonia fumes. This will cause a

Scrubber
If mole ration
below 0.40 ⇒ excess
Flourine up stack
should there be a
Port condition to
monitor this ?

rdous environment.

e ratio on the scrubber acid exceeds .60 (D.A.P.) at 1.460 specific gravity (below .60 released up the stack), the acid solution will start to set up and plug the scrubber system which in turn will stop the scrubber system from pulling ammonia fumes from the preneut tank and granulator and ammonia fumes will start venting into the building. If the mole ratio is below .40, you will be putting an excessive amount of flourine up the stack. To control the mole ratio sample the solution every 1/2 hour and run a titration on it to check the mole ratio.

3.) If the mole ratio is high in scrubbers do one of the following.

A.) Add more acid to scrubber system. Adjust controller higher than previous set point.

B.) Cut some ammonia to preneut tank. Adjust controller lower than previous set point.

C.) Cut some ammonia to granulator. Adjust controller lower than previous set point.

4.) If the mole ratio is low in scrubbers do one of the following.

A.) Cut some acid to scrubber system. Adjust controller lower than previous set point.

B.) Add some ammonia to preneut tank. Adjust controller higher than previous set point.

C.) Add some ammonia to granulator. Adjust controller higher than previous set point.

NOTE* To add or cut acid you use acid feed controller to the scrubber tank. To add or cut ammonia vapor to the preneut tank you use ammonia vapor controller to the preneut tank (MOORE controller). To add or cut ammonia vapor to the granulator you use ammonia vapor controller to the granulator .

5.) If your mole ratio in the preneut tank exceeds the amount needed for the product you are making it will make the preneut tank acid set up. which in turn will stop the preneut system and ammonia will be vented to scrubbers (can be curtailed by step 2).

A.) 18-46-0 - 1.20 to 1.45 mole ratio 1560 - 1580 spg.

B.) 16-20-0 - .60 to .65 mole ratio 1600 - 1620 spg.

C.) 11-55-0 - .80 to .85 mole ratio 1600 - 1610 spg.

D.) 11-52-0 - .80 to .85 mole ratio 1600 - 1610 spg.

6.) If the mole ratio is high in preneut tank do one of the following

A.) Add more 42% feed acid from the scrubber tank. (Adjust controller higher than previous set point.)

B.) Cut some ammonia from preneut tank using ammonia vapor to preneut tank (Adjust controller lower than previous set point).

7.) If the mole ratio is low in preneut tank do one of the following:

A.) Cut some feed acid from the scrubber tank (FRC-9). Adjust controller lower than previous set point.

B.) Add some ammonia vapor to preneut tank (MOORE controller). Adjust controller higher than previous set point.

8.) If mole ratio in the granulator exceeds the amount needed for the product you are making around a 1.04 for MAP products and a 1.75 for DAP products it could cause:

A.) A rise in the scrubber acid and in turn to the preneut acid eventually cause one or both to set up.

B.) It could also exceed the amount of ammonia that can be absorbed into the air flow in the granulator/preneut duct to scrubber system. This would let fumes vent out doors on tail end of granulator, duct doors and cracks that aren't sealed, out head end seal ring of granulator that under normal conditions would not leak, and fill the plant with ammonia fumes. This will cause a hazardous environment.

9.) If the ammonia vapor pressure on the BFL was to exceed 250 lbs there is an ammonia pressure relief valve that automatically vents out the top of the plant. To control the pressure on the ammonia vapor drum use ammonia vapor drum pressure controller (MOORE controller) to desired set point (between 60 and 80 lbs). Controlled by waste heat off process.

OP AAP / extra Copy

Agrium

RECEIVED
JAN 11 2000
DIV. OF ENVIRONMENTAL QUALITY
TECHNICAL SERVICES OFFICE

Conda Phosphate Operations
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Soda Springs, Idaho 83276
(208) 547-4381 tel
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January 5, 2000

Ms. Audrey Cole
Regional Administrator
Division of Environmental Quality
224 South Arthur
Pocatello, Idaho 83204

RE: Title V Permit Application; Revisions to Section 7 Excess Emissions Procedures (Additional Information)

Dear Ms. Cole,

The enclosed pages were inadvertently omitted from the submission to your office from Agrium CPO dated December 30, 1999. These pages should be inserted into the previous submission at the end of the section entitled, Area 2 - East Sulfuric Acid Plant. Two (2) addtional copies are again included for your convenience in forwarding to the Boise office.

If you have any questions, please call me at the number listed above.

Sincerely,

Monty Johnson
Environmental Manager

Enc.

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DIVISION OF
ENVIRONMENTAL QUALITY

NORMAL OPERATION OF EAST SULFURIC PLANT

Shane T. Passey
12/29/99

Following are:

A. Operating limits.
B. Consequences of deviation.
C. Steps required to correct or avoid deviation.

NOTE: The following limitations were compiled as per current operating standards.

1. #1 98% acid dilution flow - 43.5 gpm (Limit)
   A. Consequence of deviation - Acid strength to high or too low.
   B. Correction - Adjust dilution water flow valve.
      Note: Located on control panel
2. #2 98% acid dilution flow - 4.0 gpm (Limit)
   A. Consequence of deviation - Acid strength too high or too low.
   B. Correction - Adjust dilution water flow valve.
      Note: Located on control panel
3. 93% acid dilution flow - 14.0 gpm (Limit)
   A. Consequence of deviation - Acid strength too high or too low
   B. Correction - Adjust dilution water flow valve.
      Note: Located on control panel.
4. Sulfur feed - 44.0 gpm or 655.5 lb. per hour (Limit)
   A. Consequence of deviation - Loss of production or excessive emissions.
   B. Correction - increase sulfur flow or decrease sulfur flow. (According to ambient conditions and blower speeds)
      Note: Located on control panel and is automatic controller (raise or lower set point as needed)
5. 93% acid temp to storage - as cool as possible or below 100* (Limit)
   A. Consequence of deviation - accelerated deterioration of piping and/or storage tanks.
   B. Correction - Open or close 93% recycle block valve (manual) as needed to cycle cooler acid into product tank. Check 93% acid cooler automatic bypass to make certain it is closed 100%
      Note: Located on top of 93% product tank and just east of 93% acid pump (red wheel valve). Automatic bypass controller located on control panel.
6. 93% product flow to storage - 135 - 155 gpm (Limit)
   A. Consequences of deviation - Product tank and /or #1 98% acid tank level increase, possible overflow, possible personnel injury.
   B. Correction - check recycle manual block valve for proper setting (closing valve slightly will likely increase acid transfer), open automatic transfer valve if needed, check 93% transfer pump for proper out put, check drying tower pump for proper output.
      Note: 93% recycle manual block valve located on top of 93% acid tank and just east of 93% transfer pump (red wheel valve). 93% automatic controller located on control panel and marked as such.
7. #1 waste heat boiler water level, eye hye indication - +1.5" of normal (Limit)
   A. Consequences of deviation - over heating of boiler internals, fire tube rupture, loss of steam production through possible down time.
   B. Correction - add water to boiler, opening automatic boiler feed valve. If automatic do not respond. Open automatic bypass manual block valve a few turns and monitor level.
      Note: Automatic controller located on control panel and marked as such. Automatic bypass manual block valve is located in big steam auto control valve building, east end south side.
8. #2 waste heat boiler water level, eye hye indication - +1.5 - +3.0 of normal (Limit)
   A. Consequences of deviation - Refer to #7A
   B. Correction - Refer to #7B
      Note: Automatic controller located in big steam auto control valve building, east end, north side.
9. #1 Waste heat boiler steam production flow - 130,000 lb. per hour (Limit)
   A. Consequences of deviation - Loss of production in steam driven equipment.
   B. Correction - Keep sulfur flows at max. prescribed rates.

Note: Flow indication located on control panel and marked as such.

10. #2 waste heat boiler steam production flow - 34,000 lb. per hour (Limit)
    A. Consequences of deviation - Refer to #9A.
    B. Correction - Refer to #9B
    Note: Flow indication located on control panel and marked as such.
11. Sulfur burner temp - 1900* maximum (Limit)
    A. Consequences of deviation - Excessive emissions, increased or decrease of converter bed temps, increased or loss of steam production, deterioration of boiler refractory or loss of steam production, possible internal boiler damage.
    B. Correction - Increase or decrease main blower speed as needed (4200 rpm max.), increase or decrease sulfur flow as needed.
    Note: Main blower speed control governor located on blower deck, east end of blower, rotate clockwise to increase, counter clockwise to decrease. Sulfur flow controller located on control panel and marked as such. Rotate clockwise to increase, counter clockwise to decrease flow.
    C. Watch SO2 monitor and keep under prescribed limits (3.6 PPM per hour)
    Note: Located on control panel, east end chart.
12. Gas temp exiting #1 waste heat boiler - 675 - 680* (Limit)
    A. Consequences of deviation - Refer to 11A.
    B. Correction - Refer to 11B and 11Ba.
13. Gas temp exiting #2 waste heat boiler - 735* (Limit)
    A. Consequences of deviation - Refer to 11A.
    B. Correction - Refer to 11B and 11Ba.
14. Catalyst converter bed temps

	Inlet	Outlet
#1 -	804*	1112* (1120* Max)

    A. Consequences of deviation - loss of conversion if temps are allowed too low, possible excessive emissions, Crystallizing of catalyst grids if temp allowed too high (1125*).
    B. Correction - Open BV#2 to heat inlet of #1 bed, outlet will follow. If too hot close BV#2 to cool inlet and outlet will follow.
    Note: BV#2 is located east end of sulfur burner, south chain.

#2 -	801*	980* (Limit)

    A. Consequences of deviation - Conversion loss if temps too low, certain amount of steam production loss
    B. Correction - Open BV#5 to heat if inlet temp is too low, outlet will follow. Close to cool if temps to high, outlet will follow.
    Note: BV#5 is located east of #2 waste heat boiler in bypass duct.

#3A -	850*	895* (Limit)

    A. Consequence of deviation - loss of conversion, decreased pre-heating of boiler feed water in economizer.
    B. Correction - Open BV# 6 to heat gas stream through hot pass vessel (bypassing cooler gas)
    Note: Controller located on control panel.

#3B -	840*	890* (Limit)

    A. Consequences of deviation - loss of conversion, decreased pre-heating of boiler feed water in economizer.
    B. Correction - Open BV# 6 to heat gas stream through hot pass vessel (bypassing cooler gas)
    Note: Controller located on control panel.

Econo -	890*	456* (Limit)

    A. Consequences of deviation - Decreased pre-heating of boiler feed water, cooler gas to #1 absorbing tower.
    B. Correction - Open BV# 6 to heat gas stream in hot pass vessel which in turn will heat inlet and outlets of 3A and 3 B beds which in turn puts more heat to the inlet and outlet of economizer. (bypassing cooler gas around hot pass)
    Note: Controller located on control panel.

#4 - 800* 838* (Limit)

A. Consequences of deviation - Excessive emissions, excessive or loss of heat to cold pass vessel, loss of heat in #2 absorbing tower.
B. Corrections - Close BV# 6 to heat. Open to cool
Note: Controller located on control panel.

15. #1 98% absorbing tower acid temperature - 180* (Limit)
    A. Consequences of deviation - possible stacking, inadequate absorbing in towers.
    B. Correction - Adjust drying tower bypass automatic open to heat, closed to cool.
    Note: Controller located on control panel.
16. #2 98% absorbing tower acid temperature - 180* (Limit)
    A. Consequences of deviation - Refer to 15A.
    B. Correction - Adjust Final acid tower automatic bypass open to heat, close to cool.
    Note: Controller located on control panel.
17. Drying tower acid temperature - 160* (Limit)
    A. Consequences of deviation - above 160*, inadequate cooling of acid in #1 98% acid tank, higher acid temp at inlet of #1 98% acid cooler, high outlet acid temp of #1 98% acid cooler.
    B. Correction - Increase drying tower acid flow(open north chain valve on pipe rack south of cooler deck),close final acid tower auto bypass(located on control panel), close inter pass bypass auto valve (located on control panel), increase cooling water tower fan speed (speed selector located on top of cooling tower deck, east of either fan nozzle), reverse cooling tower fans to de-ice cooling tower fill (cold weather) (directional selector located on top of cooling tower deck, east of either fan), increase cooling water flow (2 pumps).
18. Main blower discharge pressure - 155" (limit) depending on blower speed and fan vanes being free of dirt or ice build up.
    A. Consequences of deviation - (lower discharge press) Excessive heat in sulfur burner, waste heat boilers, catalyst converters etc.
    B. Correction - Check blower speed (tachometer located on east end of blower deck), de-ice blower fan vanes, remove dirt from fan vanes (insert walnut shells through blower inlet duct hand hole)
19. #1 waste heat boiler discharge steam pressure - 260# (Limit)
    A. Consequences of deviation - Loss of production in steam driven equipment and heating needs
    B. Correction - Set 250/125# steam letdown automatic controller to prescribed set point, adjust demand automatic as needed to allow letdown free range travel.
    Note: Controller located on control panel and marked as such.
20. #2 waste heat boiler discharge steam pressure - 260# (Limit)
    A. Consequences of deviation - Refer to #19A.
    B. Correction - Refer to #19B.
21. 250# steam press - (Steam pressure read out gauge for #19 and #20
    A. Consequences of deviation - Refer to #19A
    B. Correction - Refer to #19B
22. 125# Steam pressure gauge - 120# minimum - (Limit)
    A. Consequences of deviation - loss of vacuum capabilities in phos evaporators, loss of ammonia temperature and pressure in DAP.
    B. Correction - Set automatic letdown controller to proper set point (125#), adjust automatic demand (in manual mode) to allow letdown free range travel.
23. 25# steam pressure gauge - 30# (Limit)
    A. Consequences of deviation - Back pressure in main blower cause reduction of speed, burner temp increase, catalyst converter bed temp increase.
    B. Correction - If all up stream automatic letdowns and demands are set as prescribed, call North plant and request the operator to vent the excess steam press. over 30#
24. 5# Steam pressure gauge - 6.2# (Limit)
    A. Consequences of deviation - Decreased pre-heating and deareation of water in D.A. tank.
    B. Correction - Set automatic controller to desired set point.
25. Boiler feed water discharge press gauge - 360# (limit)

A. Consequences of deviation - Inadequate boiler feed water supply to #1 and #2 waste heat boiler.
B. Correction - Make sure boiler feed pump is running or switch to the other pump.
Note: Switch gear located east side of each boiler pump.

26. Water press. to feed D.A. tank 50 - 70# (Limit)
    A. Consequences of deviation - lack of adequate water supply to D.A. tank.
    B. Correction - Adjust automatic controller to prescribed set point.
    Note: Controller located on control panel and marked as such.
27. B-5 boiler steam pressure gauge - 240#
    Note: Controlled by North plant operator.
28. #1 98% absorbing tower flow - 3300 gpm (limit)
    A. Consequences of deviation - Inadequate absorption of internal gasses, possible excessive emissions.
    B. Correction - Adjust chain operated manual block valve for proper flow.
    Note: Chain valve located on extreme south pipe rack, south valve.

Tail gas temperatures

29. Entering #1 absorbing tower - 456* (limit)
    A. Consequences of deviation - decreased ability to heat absorbing tower acid, inadequate absorption capabilities.
    B. Correction - increase economizer discharge temp, refer to #14 section #3A and #3B.
30. Entering 2000 hp. Booster blower - 168* (limit)
    A. Consequences of deviation - decreased cooling capabilities if cold pass
    B. Correction - refer to #29B
31. Entering cold pass heat exchanger - 224* (Limit)
    A. Consequences of deviation - increased or decrease of beds 3A, 3B and/or 4th, increase and/or decrease of acid temp of #2 absorbing tower acid.
    B. Correction - N/A
32. Exiting cold pass heat exchanger - 661* (Limit)
    A. Consequences of deviation - Increase and/or decrease heating/or cooling capabilities of hot pass heat exchanger, and 4th bed.
    B. Correction - Open BV# 6 to bypass hot pass heat exchanger or close to direct gas stream through hot pass heat exchanger.
    Note: BV# 6 damper controller located on control panel and marked as such.
33. Entering #2 absorbing tower - 396* (Limit)
    A. Consequences of deviation - Increase or decrease ability to heat or cool #2 absorbing tower acid, possible decrease in tower absorption capabilities, possible excessive emissions.
    B. Correction - Refer to 32B
34. Exiting #2 absorbing tower - 175* (Limit)
    A. Consequences of deviation - N/A
    B. Correction - N/A
35. 2000 hp. Booster blower Discharge pressure - 68" current rate and ambient conditions (limit)
    A. Consequences of deviation - N/A
    B. Correction - N/A
36. 2000 hp booster blower mechanical oil pressure - 28# (limit)
    A. Consequences of deviation - Inadequate oil supply to blower bearings
    B. Correction - increase mechanical oil pump out put.
    Note: Increase oil press by turning adjustment knob located on mechanical oil pump, south end of booster blower.
37. 2000 hp booster blower inlet pressure - +1.0 - +2.0 (limit)
    A. Consequences of deviation - System internal gas stream flow, loss of absorption capabilities in #1 absorbing tower, possible excessive emissions.
    B. Correction - Close booster blower louvers to obtain prescribed setting.
    Note Open louvers to increase gas stream flow, which will lower inlet press. Close to slow gas stream, which will increase inlet press and aid in absorption capabilities and help keep emissions

under control.

38. 2000 hp booster blower amp meter read out - 420 (limit)
    A. Consequences of deviation - possible damage to booster blower motor, booster blower shutting down, excessive emissions, excessive heat of catalyst converter, excessive heat of sulfur burner, added stress to main blower.
    B. Correction - Close back some on the booster blower louvers to decrease motor amp load.
       Note : Controller located on control panel.
39. Steam pressure to sulfur feed lines - 40 - 60# (limit)
    A. Consequences of deviation - Internal "freeze up" of sulfur, production loss.
    B. Correction - Adjust automatic controller to preseribed setting, or adjust manual bypass as needed.
       Note: Both located west of east plant control room just east of sulfur rail car dumping pit.
40. Raw water pressure 80* min 120* (limit)
    A. Consequence of deviation - Below minimum, inadequate water supply to water regeneration units, above maximum, possible rupture of raw water supply lines.
    B. Correction - Call supervisor to adjust wells for proper flow pressures.
41. O2 Monitor readings 5.0 (limit)
    A. Consequences of deviation - possible excessive emissions
    B. Correction - Adjust sulfur flow to burner according to recommendations, blower speed, bed temps for proper temp ranges.
42. North cooling tower fan amp read out - 140 amps (limit)
    A. consequences of deviation - Fan motor damage, shut down of fan, increased heat of cooling water, increased acid temps.
    B. Correction - N/A
43. South cooling tower fan amp read out - 150 amps (limit)
    A. Consequences of deviation - Refer to 42A
    B. Correction - N/A
44. "A" cooling tower pump amp read out - 160 amps (limit)
    A. Consequences of deviation - Damage to pump motor, shut down of pump, increased heat of acid due to loss of cooling water circulation.
    B. Correction - N/A
45. "B" cooling tower pump amp meter read out - 160 amps (limit)
    A. Consequences of deviation - Refer to #44A
    B. Correction - Refer to #44B
46. "C" cooling tower pump amp meter read out - 175 amps (limit)
    A. Consequences of deviation - Refer to #44A
    B. Correction - Refer to #44B
47. 2000 hp booster blower fan bearing temperature read outs
    A. North bearing - 140 - 160* (Limit)
        a. Consequences of deviation - overheating of fan bearings, possible damage to bearings and fan shaft, down time, loss of production.
        b. Correction - Add cooling water to oil cooler as needed.
           Note: Adjust water flow valve to oil cooler, located at north east corner of oil reservoir.
    B. South bearing - 140 - 160* (Limit)
        a. Consequences of deviation - Refer to 47a.
        b. Correction - Refer to 47b.
48. 2000 hp booster blower motor bearing temperature read out.
    A. South bearing - 140 - 160*
        a. Consequences of deviation - Refer to 47a.
        b. Correction - Refer to 47b.

DUTIES

A Operator, steps; 1B, 2B, 3B, 4B, 5B, 6B, 7B, 8B, 9B, 10B, 11B, 11C, 12B, 13B, 14 - #1B, 14 #2B, 14 #3AB, 14 #3BB, 14 econo B, 14 #4B, 15B, 16B, 17B, 18B, 19B, 20B, 21B, 22B, 23B, 24B, 25B 26B, 27 (North plant A operator), 28B, 29B, 30B, 31B, 32B, 33B, 34B, 35B, 36B, 37B, 38B, 39B, 40B, 41B, 42B, 43B, 44B, 45B, 46B, 47B, 48B
B Operator, steps; N/A during normal operation.